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RELATIVE ABUNDANCE AND HABITAT PREFERENCES OF LEAST BITTERNS (*IXOBRYCHUS EXILIS*) IN THE EVERGLADES

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Abstract.—From May through July of 1987, we encountered 607 Least Bitterns (*Ixobrychus exilis*) during 3,502 km of airboat survey in Water Conservation Area 3A of the central Everglades. Bitterns were found significantly more often along airboat trails than on canals or in open grassland, and were encountered significantly more frequently in the northeastern corner of the study area. Bitterns were most often found in association with pure sawgrass (*Cladium jamaicencis*) or mixed sawgrass/cattail (*Typha* spp.), and were rarely found in wet prairie vegetation. No preference was noted for cattail, burns, or willow (*Salix caroliniana*) ponds. The observed sex ratio was close to parity (1.04). Young appeared in large numbers after June 15. Less than three percent of the birds flushed were struck by the airboat, probably representing a minimum mortality for airboat traffic.

Least Bitterns (*Ixobrychus exilis*), the smallest and the most secretive of the North American Ardeidae, have been the subject of little quantitative research. Weller's (1961) account of the breeding biology is the only substantial contribution to date, and all quantitative studies of breeding biology have been done in the northern and western states (Beecher 1942, Kent 1951, Wood 1951, Manci and Rusch 1988). The relevance of this information to breeding biology in the southeast is unknown. Within Florida, Kushlan (1973) noted a dense nesting aggregation in the Everglades, and Bowman and Bancroft (1989) summarized nesting records occurring in the Keys.

Many authors have noted an association of Least Bitterns with cattail (*Typha* spp.), vegetated edges (summarized in Weller 1961), and nutrient-rich microhabitats (Kushlan 1973) for feeding and breeding. How-

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ever, none have demonstrated preferences for these habitat variables. Least Bitterns also are weak fliers, and may be especially vulnerable to fast-moving airboats, which are commonly used in southern marshes. The effect of airboat activity on Least Bittern populations is unknown. In this paper, we present the results of a 3-month survey of Least Bitterns flushed during regular airboat travel throughout Water Conservation Area 3A, in the central Everglades marshes of southern Florida. We include analyses of habitat and vegetational preferences, indices of abundance, and effects of airboats on Least Bittern mortality.

Methods

We studied Least Bitterns in Water Conservation Area 3A (WCA 3A), in Dade and Broward counties during March through July of 1987 (Fig. 1). WCA 3A is a 237,000 ha. impounded freshwater marsh, in which water level fluctuates according to a predetermined management plan. During other studies (Bennetts et al. 1988, Frederick and Collopy 1989, respectively), we regularly traversed much of the study area by airboat. Travel was along established airboat trails, through areas of undisturbed grassland and open water, and along canals during daylight hours. During airboat trips, we recorded the location, age, sex, habitat characteristics, and vegetation from which Least Bitterns flushed. We defined three major habitat types: airboat trails, open grassland, and canal edges. Density of vegetation was estimated as dense if stalks and leaves constituted greater than 50% of the areal coverage, and sparse if less than 50%. Bitterns observed in direct flight at or above 5 m above ground level were not recorded. From maps, we estimated the total distance we traveled during each trip on trails, open grassland, and canals, and traveled a total of 3,502 km during 82 boat-days. In some cases, survey routes were repeated regularly (particularly in the northeastern section of WCA3), or in other cases were followed only once. The approximate location of all survey routes is shown in Figure 1.

Results

We sighted a total of 607 individual bitterns (Table 1). Birds were rarely seen except when flushed, and nearly all birds flushed were within 2 m of the side of the boat.

Geographic and habitat preferences.—All classes of birds combined were sighted at a rate of 0.17 birds per km (Table 1). However, this rate varied dramatically with habitat. In canals, open grassland, and trails, we found 0.13, 0.04, and 0.37 birds/km, respectively. Frequency of sighting was not in proportion to the distance we traveled in any habitat (entire study area, Chi^2 goodness of fit = 525.16, $P << 0.001$). The highest densities within any subdivision of the study area were found on airboat trails.

The study area showed major geographic differences in densities, and can be conveniently divided into northeastern (shaded area, Fig. 1) and south-central sections. We found the highest density of bitterns in the northeastern part of the study area in all three major habitat categories. These differences were not in proportion to the distance traveled in each

of the two study area sections either when all habitat types were lumped (Chi^2 goodness of fit = 4,810, P << 0. 001) or when grassland and trail sightings were examined individually (Chi^2 = 73.09, and 364.61, respectively, P << 0.001 for both). In the northeastern section, density along canals was lower than that for open grassland. The lowest densities were

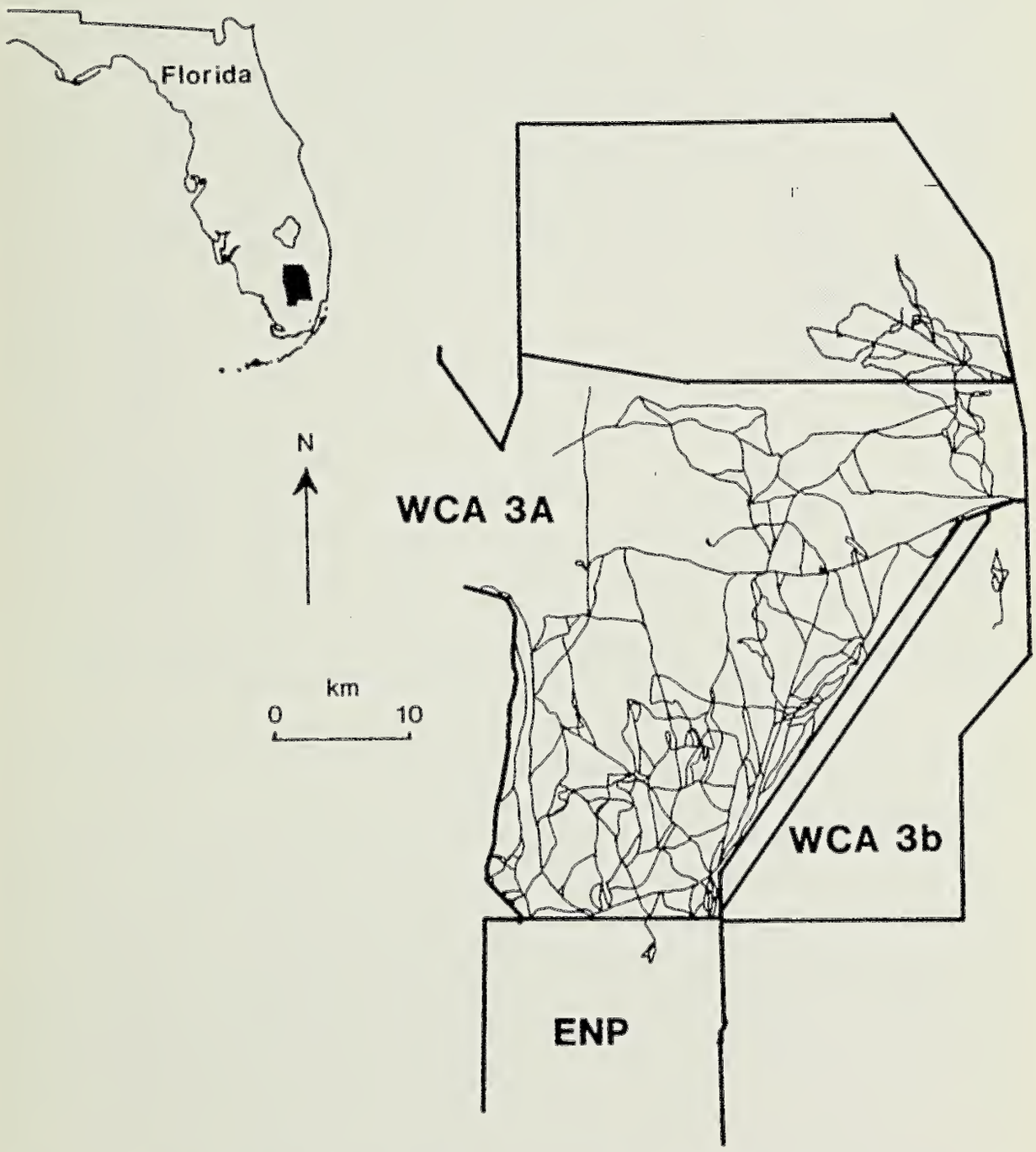

Figure 1. Map of the study area and location within Florida, showing major canals surrounding Water Conservation Area 3A and 3B (WCA 3A, WCA 3B, respectively), and Everglades National Park (ENP). Heavy lines denote boundaries or canals; thin lines show airboat trails traveled more than once during the period of study. The northeastern part of the study area is shown shaded in gray.

Table 1. Summary of Least Bittern sightings in WCA 3 by geographic location, habitat type, age, and sex.

Study area	Males	Females	Im-matures	Un-identified	Total	Km traveled	Birds/km
Northeast							
canal	0	2	7	3	12	103	0.11
grassland	11	5	8	9	33	155.4	0.21
trails	69	70	163	103	405	337.5	1.20
other[1]				11	11		
total	80	77	178	126	461	595.9	0.77
Central and West							
canal	7	5	6	5	23	26	0.08
grassland	11	8	10	6	35	1012	0.03
trails	9	5	19	30	63	450	0.13
other	6	3	4	12	25		
other	33	21	39	53	146	1488	0.07
South of Tamiami							
canal						0.4	0.00
grassland					1	33.1	0.03
trails	1				1	35.1	0.03
total	1	1			1	69.0	0.03
Total							
canal	7	7	13	8	35	268.8	0.13
grassland	22	14	18	15	69	1959.3	0.04
trails	79	75	182	133	469	1273.3	0.37
other	6	3	4	21	34		
total	114	99	217	177	607	3502	0.18

[1]Combined counts for burns, buttonbush heads, willow ponds, open sloughs, prairies.

found south of Tamiami Trail (US Route 41), though this latter estimate is from only 69 km of survey in a small area.

Vegetative associations.—Because we could not estimate distance traveled through vegetative subclasses within each habitat, we were unable to strictly compare numbers of birds seen relative to vegetation sampled. Our surveys did, however, frequently encompass all of the dominant vegetative types shown in Table 2, often on every trip. Our analysis of vegetation should therefore be treated as an index of occurrence rather than as a measure of vegetative preference. We most frequently observed bitterns in mixed cattail/sawgrass (29.0% of birds) though homogeneous sawgrass (22.6%) and homogeneous cattail (8.6%) also were used. Bitterns were found almost twice as often in dense as in sparse stands within all three classes of vegetation. Other vegetative classes were used relatively infrequently (combined total of 1.6%). Adult birds did not differ dramatically from the entire sample (adults, juveniles, and unidentified birds) in their patterns of vegetative association (Table 2).

Bitterns did not frequent open sloughs, rush (*Eleocharis* spp.) prairies, or mats of emergent vegetation; this was confirmed by the very low frequency of occurrence in *Eleocharis* sp., pickerel-weed (*Pontedaria cordata*), arrowhead (*Sagittaria* spp.), and maidencane (*Panicum hemitomon*). Though we regularly visited two major burn areas in the western part of the study area, and one in the northeast, we observed no dramatic increase of bitterns in burned areas, as was noted by Kushlan (1973).

Sex ratio.—Because the northeastern part of the study area was the only subdivision censused regularly prior to hatching of young, and was the most intensively and regularly censused, we chose to compare categories of age and sex only in that unit. During the entire census period, we encountered 80 males, 77 females, 178 immatures or fledglings, and 126 birds which could not be accurately identified to sex or age class (Table 1). The ratio of males to females was close to parity (1.04). Considering that we probably were more likely to identify males to sex than females (adult male plumage is easier to identify), we suspect that there existed no large departure from equal proportions among adults.

Breeding.—Large numbers of fledgling bitterns were first seen after the middle of June in the northeast (Fig. 2). Using the nesting phenology outlined by Weller (1961) and Bent (1926), this implies most nest initiations occurred following 18 May. Prior to the beginning of this fledgling period (roughly 15 June) we found adults occurring at a rate of 0.18/km (all habitats lumped), ranging from 0.27/km on airboat trails to 0.00/km on canals (Table 3). If all adults seen could be considered breeding (a generous assumption), this would result in a maximum estimate of 0.089 breeding pairs per km, peaking along airboat trails at 0.135/km. In general, we observed breeding to be less dense and to start earlier in the northern part of the study area than in the south and central parts.

Impact of airboat travel on Least Bitterns.—Of the 607 birds seen, 17 (2.8%) were struck by the airboat despite all attempts by the driver to avoid contact. Two of those struck died almost immediately, seven (41%) were alive and left the area flying (including two which had passed completely under the boat's hull), and four birds could not be located despite intensive search. Of the seven flying survivors, one flew with a dangling leg, suggesting a leg injury.

DISCUSSION

Because we could not estimate the efficiency with which we flushed Least Bitterns, all frequency of occurrence estimates should be considered mimimums. We also were unable to estimate our efficiency at spot-

Table 2. Sightings of Least Bitterns by vegetation type.

Vegetative classes[1]	All sightings		Adults only	
	Birds seen	Percent of total	Birds seen	Percent of total
Sawgrass				
dense, water lillies[2]	13	2.1	4	1.57
dense, emergent[3]	49	7.7	13	6.3
total dense	90	14.1	33	16.0
sparse, water lillies	36	5.6	12	5.8
sparse, emergent	60	9.4	23	11.2
sparse, buttonbush	6	0.94	2	0.97
total sparse	54	8.46	24	11.7
total sawgrass	144	22.6	57	27.7
Cattail				
dense, water lillies	2	0.31	0	0
dense, emergent	1	0.15	0	0
total dense	55	8.6	23	11.1
sparse, water lillies	4	0.62	2	0.97
sparse, emergent	6	0.90	2	1.0
total sparse	23	3.6	7	3.4
total cattail	78	12.2	30	14.6
Mixed cattail/sawgrass				
dense, water lillies	6	0.94	3	1.5
dense, emergent	5	0.80	0	0
total dense	150	23.5	39	18.9
sparse, water lillies	3	0.47	1	0.49
sparse, emergent	21	3.3	6	2.9
total sparse	33	5.2	8	3.9
total mixed cattail/ sawgrass	183	28.7	47	22.8
Eleocharis sp. mat	2	0.31	0	0
Buttonbush head	3	0.47	1	0.49
Willow head	2	0.31	2	0.97
Emergent, no grass	3	0.47	1	0.49
Total	638	100.0	206	100.0

[1]Dominant vegetation, density, and associated species.
[2]Scientific names: sawgrass (*Cladium jamaciencis*), cattail (*Typha* spp.), water lillies (*Nyphaea odorata*), buttonbush (*Cephalanthus occidentalis*), willow (*Salix caroliniana*).
[3]Combined *Pontedaria cordata*, *Sagitaria* spp., and *Panicum hemitomon* associations.

ting birds which did attempt to flush; this could have an important effect depending on vegetation type. We suspect that the locations from which bitterns did flush were an accurate indicator of relative habitat usage, because bitterns usually freeze in place prior to flushing, and attempt

Table 3. Estimated breeding of Least Bitterns in the northeastern section of Water Conservation Area 3A[1].

Habitat	Km traveled	Males	Females	Pairs/km
canal	55.8	0	0	0
grassland	122.3	10	3	0.08
trail	239.9	31	34	0.13
total	418	41	37	0.10

[1]See shaded area in Fig. 1.

walking escape only when approached relatively slowly (Weller 1961). Because nearly all flushing occurred within 2 m of the side of the boat, we suspect bitterns either freeze beyond this distance, or (in the case of airboat trails) are unable to flush except into the open from edges because of dense vegetation. We usually did not travel within 2 m of the edges of canals, and may therefore have underestimated densities in canal edge habitat.

Bitterns were much more frequently encountered in the northeastern section of WCA 3 than in any other part. By comparison with the rest of the study area, the northeastern section can be characterized as having generally denser grasslands, a thicker underlying peat substrate, a slightly higher proportion of cattail, and a close proximity to canals bearing water with a high nutrient load. We could not determine which (if any) of these differences made the northeast more attractive to breeding

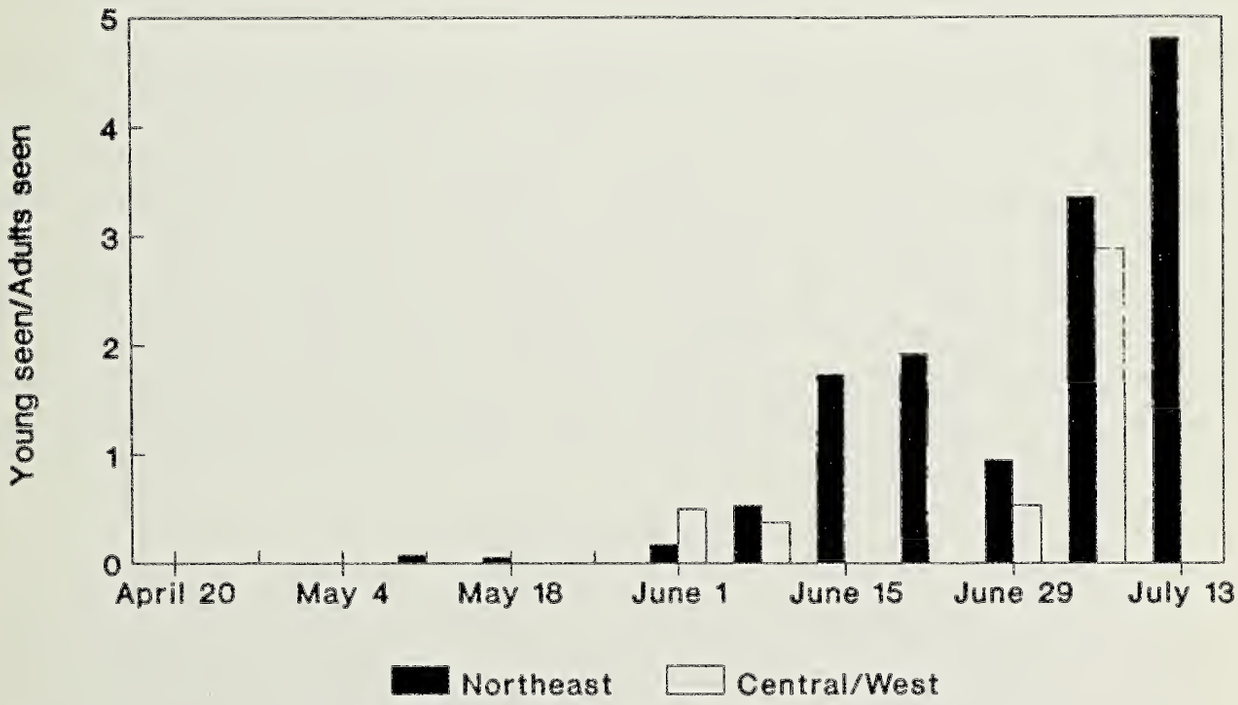

Figure 2. Ratios of young Least Bitterns seen to adult bitterns seen in two parts of the study area as a function of time within the study period. Sightings of bitterns are grouped into 7-day periods beginning on April 20.

bitterns. We believe that aspects of surface water dynamics (drying rate, gradient of depths, flow characteristics) in the northeast were well represented elsewhere in areas of WCA 3 censused regularly and were not responsible for the difference in bittern density. An accurate answer to this question will require a balanced manipulation of nutrients in similarly vegetated plots.

Bitterns showed an apparent preference for airboat trail edges. We hypothesize that bitterns may prefer trails because they offer both dense vegetation and a well-defined edge bordering on patches of open water. Both edges and dense vegetation have been reported as preferred nesting habitat in northern lakes (Weller 1961). Airboat trails also may be preferred because they contain relatively deep and more permanent water than the surrounding sloughs. However, even deeper and more permanent willow ponds (often surrounded in part by dense grasses) were rarely used by bitterns.

Sawgrass and mixed-sawgrass were the most important vegetative classes used by bitterns. Bitterns were flushed more frequently from dense stands than sparse and flushed rarely from stands of pure cattail. This suggests that cattail itself is not necessarily attractive to bitterns, and that sawgrass is an adequate substrate to support even relatively dense populations of Least Bitterns (Kushlan 1973). We hypothesize that bitterns show a strong association with cattail in northern lakes because cattail is one of the few tall plants growing densely in relatively deep water. In addition, it seemed clear that bitterns spent nearly all their daylight time in grass-like vegetation, rather than on open mats of emergent vegetation.

Airboat travel resulted in relatively little mortality of flushed birds (<3%). Our estimates should be taken as minimum possible mortality figures, because we were visually searching for bitterns, and making every attempt to avoid hitting them. This is probably not representative of recreational airboat traffic. We also have no estimate of damage done to nests or to birds which remained hidden. If, as adult densities suggest, nests are concentrated on edges of airboat trails, airboat damage to nests may be minimal. Airboats usually travel in the middle of trails where trails are available (particularly where vegetation is dense) because far less fuel is required.

Acknowledgments

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NOTES

Florida Field Naturalist 18(1): 10-12, 1990.

Harlan's Hawk Over-winters in St. Lucie County, Florida

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On 1 January 1988, while participating in the Fort Pierce Christmas Bird Count, staff members of Ankona Raptor Research, Inc., observed an unusually marked hawk on a utility pole at SR 70 and Header Canal, St. Lucie County, Florida. The bird was lured, trapped and banded (US Fish and Wildlife Service band number 1387-02672). Color photographs were taken and the bird was released at 0900 h.

At the time, the bird was believed to be a Krider's Hawk (*Buteo jamaicensis kriderii*) because of the white tail with narrow rufous sub-terminal band. However, after careful scrutiny of photos, examination of study skins at the Laboratory of Ornithology at Cornell University and consultation with Brian Toland, we determined the bird to be a light morph Harlan's Hawk (*B. j. harlani*). The Harlan's tail has "dark gray longitudinal mottling, usually with a terminal band" (Clark 1987: 71), whereas, the Krider's tail lacks this mottling and presents an overall paler appearance.

On 16 January 1989 a light morph adult Harlan's Hawk was again observed at SR 70 and Header Canal by Peter Polisse and Tony Leukering. The bird was wearing a USFWS band on the left leg and was identical in all aspects to the bird captured in 1988. On the morning of 28 January 1989 Brian Toland and Ankona Raptor Research staff members again observed the bird in its usual area. The bird remained on territory throughout February and departed sometime between 11 and 18 March 1989. The reappearance of this individual demonstrates wintering site fidelity, a characteristic of Harlan's Hawk (Lavers 1975).

The normal breeding range of Harlan's Hawk is southwestern Alaska. Core wintering area is the Great Plains of the southcentral United States. However, Harlan's have been seen during the winter in every state west of the Mississippi River except Nevada, with a few reports from Massachusetts and South Carolina (Mindell 1985). "*Harlani* makes the longest migration of any Red-talled Hawk subspecies" (Mindell 1983).

Harlan's and Krider's Hawks, along with other Red-tailed Hawk subspecies (*calurus* and *borealis*) appear with varying frequency during the winter in Florida. We observed three Krider's in eastcentral Florida during 1988-89 winter field work. Brian Millsap (pers. comm.) reports seeing both Harlan's color phases during the winter 1988-89.

Acknowledgments

Capture and initial observations were made by Peter Polisse, Susan R. Blackshaw and Fred Schaeffer of Ankona Raptor Research, Inc., and Mark Williams of Owings Mills, Maryland. We wish to thank Brian Toland for identification assistance, and Brian Millsap and James Rodgers for their help in reviewing the manuscript.

Figure 1. Dorsal view of Harlan's Hawk showing the typical tail pattern. The breast and belly are entirely white.

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Florida Field Naturalist 18(1): 12-14, 1990.

Coyote Distribution in Florida

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In the 1960s, coyotes (*Canis latrans*) extended their range into the southern states east of the Mississippi River (Gipson 1978). This expansion has been in part natural, but also has been directly influenced by humans, who have imported coyotes from other states and released them in the southeast to be chased with hounds (Hill et al. 1987). In 1981, Brady and Campell (1983) determined the distribution of coyotes in Florida. More recently, increasing reports of coyote sightings and suspected coyote depredations on livestock and watermelon crops suggest that coyotes have become more numerous and widespread in Florida.

In 1988, we conducted a mail survey to determine the current distribution of coyotes in Florida. Surveys were sent to 428 employees of the Florida Game and Fresh Water Fish Commission. A map was provided for survey recipients to mark specific locations where coyotes or coyote sign had been observed since 1983. Respondents also were asked to shade counties or parts of counties where they had a general knowledge of coyote occurrence.

Of the 428 surveys mailed, 262 (61%) were returned, representing all areas of the state. Based on reports of coyote sightings, sign, or vocalizations, the current distribution of coyotes in Florida was depicted (Fig. 1).

Brady and Campell (1983) documented the presence of coyotes in 18 of Florida's 67 counties. On the distribution map they presented, coyotes occurred in the western panhandle and in scattered locations along the Central Highland Ridge from Hamilton to Orange counties. In the current survey, coyotes were reported present in 48 counties. Coyotes now occur throughout most of Florida, and appear to be well established across the panhandle and into north-central Florida. Although there are scattered reports of coyotes throughout the central peninsula to as far south as Broward and Collier counties, it does not appear that coyotes are firmly established in the central and southern portion of the state.

Although there were slight differences in survey methods between the current survey and that conducted in 1981 (Brady and Campell 1983), it appears that coyotes have greatly

expanded their range in Florida. It is expected that coyotes will continue to expand their distribution in Florida. Although there are rumors that coyotes continue to be illegally imported and released, we suspect that further range expansion will result primarily through the dispersal of coyotes born within the state.

Acknowledgments

We thank the many people who shared with us their knowledge of the coyote in Florida. We also thank J. R. Brady, P. E. Moler, and M. F. Delany for reviewing the note. Thanks also to T. L. Steele for preparing this note.

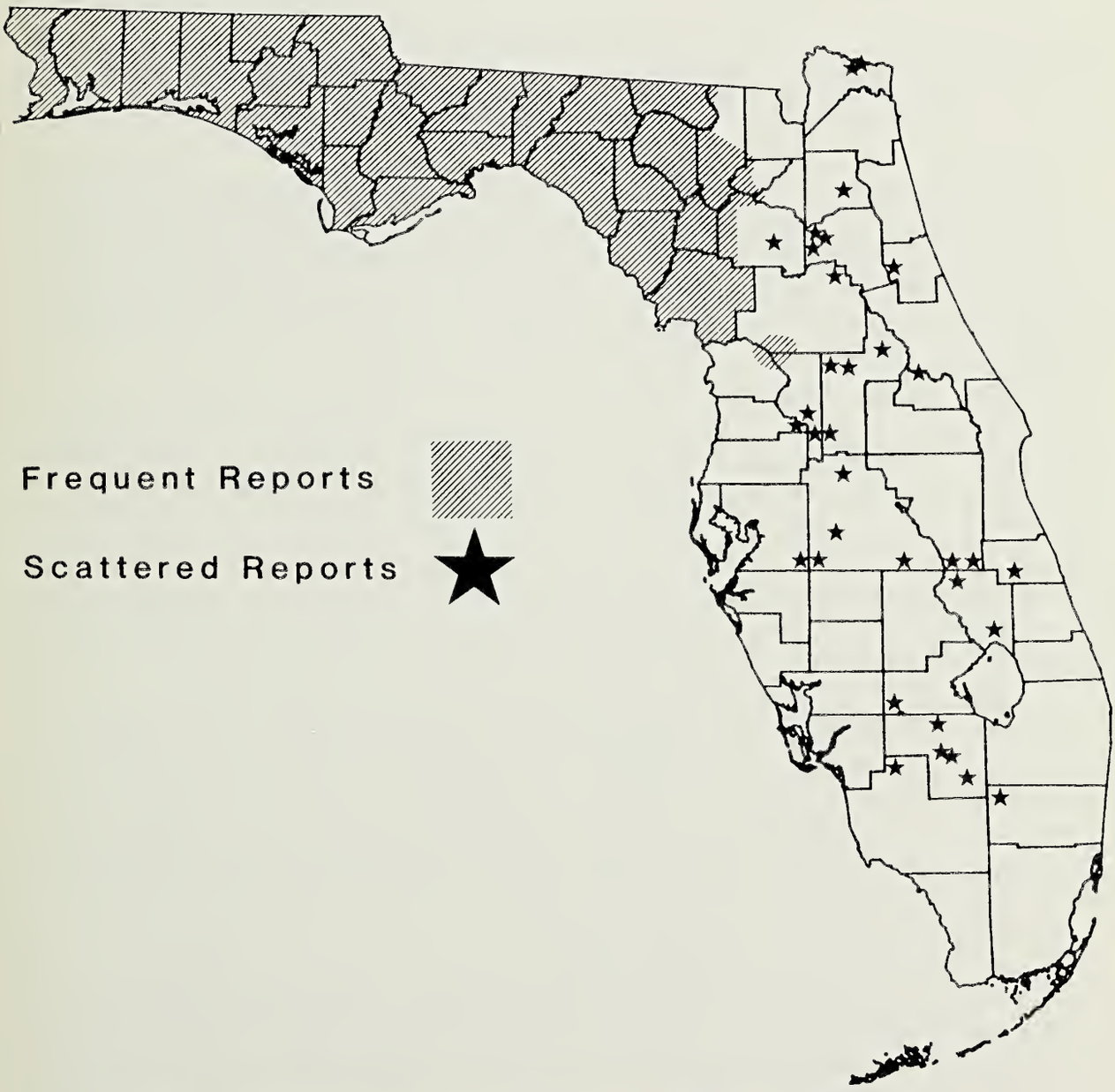

Figure 1. Distribution of coyotes in Florida based on a 1988 mail survey.

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A Case of Competition Between European Starlings and West Indian Woodpeckers on Abaco, Bahamas

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Competition between European Starlings (*Sturnus vulgaris*) and other cavity-nesting species has been well documented in North America (e.g. Wood 1924, Shelley 1935, Howell 1943, Polder 1963, Zeleny 1969, Ingold 1989). Cruz (1977) reports competition between starlings and Jamaican Woodpeckers (*Melanerpes radiolatus*), but I have found no published accounts of starlings competing with woodpeckers in the Bahamas. Bond (1985) lists the starling as wintering in the Bahamas (14 October-18 March).

I here report competition between the West Indian Woodpecker (*M. superciliaris*) and European Starling on Abaco, Bahamas. This also documents European Starlings breeding on the island. I observed nesting West Indian Woodpeckers from 10 May to 4 August 1988, and 13 May to 25 June 1989. No starlings were observed during the 1988 field season.

On 14 May 1989, at Bahama Palm Shores, Abaco, I first observed a European Starling while watching a male West Indian Woodpecker pull nest material out of a cavity within the eaves of a house. This cavity was successfully used as a nest by woodpeckers in 1988 when no starlings were observed. The starling approached the cavity and chased the woodpecker away. There was no physical contact, the woodpecker was simply displaced. The starling then joined another starling, presumably its mate, in a nearby tree.

On 31 May the starlings had established a nest and were incubating in the woodpecker cavity. There also was a pair of woodpeckers in the area. The banded female woodpecker drummed on the house above the cavity and gave territorial cells while a starling was in the cavity. The male woodpecker was nearby. When the starling came out of the cavity, the starling pair chased away the woodpecker pair. The starling pair then returned and one went into the cavity. On 1 June the male woodpecker was in the area but no interaction was observed. The starlings were still incubating.

The woodpecker nest site within the house was unusual and may reflect a general scarcity of large dead trees suitable for nest sites. However, such a site is typical for the more anthropophilic starling (e.g. Kessel 1957, Zeleny 1969). In June 1989 I also found several starlings at Casuarina Point, another small community on Abaco, approximately 9 km from Bahama Palm Shores. My studies of West Indian Woodpeckers on Abaco suggest that the limited availability of suitable nest sites in the forest is forcing the West Indian

Woodpecker to populated areas where coconut palms (*Cocos nucifera*) have been introduced and thus available as nest sites. Should the starling population increase sufficiently, it may pose a threat to the West Indian Woodpecker as well as to other cavity-nesting birds on the island (e.g. Stolid Flycatcher (*Myiarchus stolidus*), and Bahama Swallow (*Callichelidon cyaneoviridis*)).

I thank the Bahamian government for permission to conduct field research, and the logistical support of Simeon Pinder (Ministry of Agriculture), Shireen Chambers, and John Hook (Ministry of Lands and Surveys). Financial support was provided by the Association of Field Ornithologists, Eastern Bird Banding Banding Association, North American Bluebird Society, Wilson Ornithological Society, World Nature Association, and Mississippi State University.

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The *Florida Field Naturalist* is a quarterly publication of the Florida Ornithological Society. It is a fully refereed technical journal of field biology and natural history. Its contents are listed or abstracted in prominent bibliographic sources including: *Biological Abstracts* (BIOSIS); *Zoological Record*; American Ornithologists' Union and British Ornithologists' Union *Recent Ornithological Literature Supplement*; *Wildlife Review*; *Swiss Wildlife Information Service Key Word Index.*

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Express all measurements in units of the SI System (Système International d'Unités). These units are weight in gram (g) or kilogram (kg), length in metre (m), or kilometre (km), time in second (s), area in square metre (m^2) or hectare (ha), speed in metre per second (ms^{-1}), energy in joule (J), and power in watt (W). See a dictionary for conversion factors. If desired in addition, the equivalent value in the English system may be provided parenthetically. Use abbreviations for measurement units in text when they follow a quantity (2 km, 12 ha, 90 s). Unless they are followed by such a measurement unit, spell out numbers less than ten, e.g. six birds but 6 m. Use the 24-hour time system and the military date system. That is, use "0306 of 11 March 1980" for 3:06 A.M., March 11, 1980 and use "1506 of 13 September 1984" for 3:06 P.M., September 13, 1984.

In naming organisms follow standard taxonomic works for each group. Capitalize the common names of birds, and follow The AOU Check-list of North American Birds, sixth edition, 1983, and subsequent supplements for scientific names. Do not capitalize the common names of other vertebrates or plants. For reptiles and amphibians use Collins et al., 1982, Standard Common and Current Scientific Names for North American Amphibians and Reptiles, second edition, Society for the Study of Amphibians and Reptiles Herpetological Circular 12. For mammals use Honacki et al., 1982, Mammal Species of the World, Allen Press and the Association of Systematic Collections, Lawrence, Kansas. For fishes

use Robins et al., 1980, A List of Common and Scientific Names of Fishes from the United States and Canada, fourth edition, American Fisheries Society Special Publication 12. For other animals and plants cite the sources used for common and scientific names in the Methods section. Give the scientific name of each organism, underlined and in parentheses, when it is first mentioned in text or in a table. Thereafter use common names if possible.

The *Florida Field Naturalist* encourages the submission of reports on the changing distribution and occurrence of rare species in its geographic area. All sight records of occurrences of birds in Florida submitted for publication are reviewed for acceptability by the Records Committee of the Florida Ornithological Society. Prior or simultaneous submission of a record to the committee on its standard form will decrease the time and expense required to consider it for publication. Notices of a record in *American Birds*, newsletters, or Records Committee reports do not preclude submission of a paper with additional details to the *Florida Field Naturalist*, but previous notices should be cited. All reports must contain the time, place (including county), circumstances, and documentation of the observation sufficient to assure proper identification was made. Specimens and photographs should be deposited in a scientific collection. Give their accession numbers in text. The Florida Museum of Natural History is the official depository for the Florida Ornithological Society. Citations of other pertinent records, a summary of overall status of the species, and a discussion of relevant biological factors should be part of most reports. Distribution notes are encouraged from observers who have not previously written such reports. If presubmission assistance with distribution notes is desired, contact the Associate Editor (for distribution reports), who can provide advice on the desirability of submission, information to be included, format of presentation, and composition of the note prior to submission for the Editor's consideration.

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FLORIDA ORNITHOLOGICAL SOCIETY SPECIAL PUBLICATIONS

Species Index to Florida Bird Records in Audubon Field Notes and American Birds Volumes 1-30 1947-1976, by Margaret C. Bowman. 1978. Florida Ornithological Society, Special Publication No. 1. Price $4.00.

The Carolina Parakeet in Florida, by Daniel McKinley. 1985. Florida Ornithological Society, Special Publication No. 2. Price $6.00.

Status and Distribution of the Florida Scrub Jay, by Jeffrey A. Cox. 1987. Florida Ornithological Society, Special Publication No. 3. Price $8.00.

Order prepaid from the Secretary; add $1.00 for handling and shipping charge. Make checks payable to the Florida Ornithological Society.

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Summary of the 1989 Fall Meeting.—The fall 1989 meeting of the Florida Ornithological Society was held at the Holiday Inn in Titusville, Florida, from 6-8 October. Indian River Audubon Society was the host chapter, and Bob Brown was the local committee chairman.

During the board meeting, it was announced that volunteers had been found to compile a field notes section for the *Florida Field Naturalist.* This will be compiled on a regional basis, with Jim Cox as the general editor. Glen and Jan Woolfenden submitted a manuscript of an updated index of Florida bird records in *American Birds* for consideration as a special publication. Jocie Baker, Wally George, and Henry Stevenson were appointed to the Records Committee. FOS has been approached by the Wilson Ornithological Society to hold a joint meeting.

Johnnie Johnson of the Brevard Museum presented a workshop on pelagic birds of the east Florida coast on Saturday afternoon. The Saturday afternoon paper session was presented by researchers at Archbold Biological Station. Papers were presented on "Galapagos Mockingbirds: Cooperative Breeding in a Variable Climate" by Robert L. Curry and "Conservation of the Florida Scrub and Its Jays" by John W. Fitzpatrick.

The skin quiz, primarily of pelagics, was prepared by Dr. J. W. Hardy of the University of Florida. Glen Woolfenden won first prize, and Mort Cooper won second prize. Wes Biggs presented a framed Ray Harm print of a Yellow-breasted Chat to Becky Payne, Region IV Coordinator, as Breeding Bird Atlas Coordinator of the Year.

Before the banquet on Saturday evening, several speakers presented a testimonial to Helen Cruickshank. A selection of her slides, now in the VIREO collection, were shown during the testimonial. Dr. Llewellyn Ehrhart of the University of Central Florida was the banquet speaker. He spoke on "The Turtles of East Florida's Beaches, Lagoons, and Warm Reefs: Is This What Dr. Carr Had in Mind?"

Field trips were held to Oak Hill and Hog Valley; Black Point Drive in Merritt Island National Wildlife Refuge; Port Canaveral and Cocoa Beach Hammocks; and Windover Farms, Sarno Marsh, and Duda Ranch. FOS field trips were permitted to Merritt Island National Wildlife Refuge despite the closing of the refuge because of the controversial Shuttle launch. A pelagic trip was conducted on Sunday.

The usual good time was had by all. The spring meeting will be in Fort Myers. No date has been set for the spring meeting.—**Bruce Neville,** 8221 SW 72 Ave., #273, Miami, Florida 33143.

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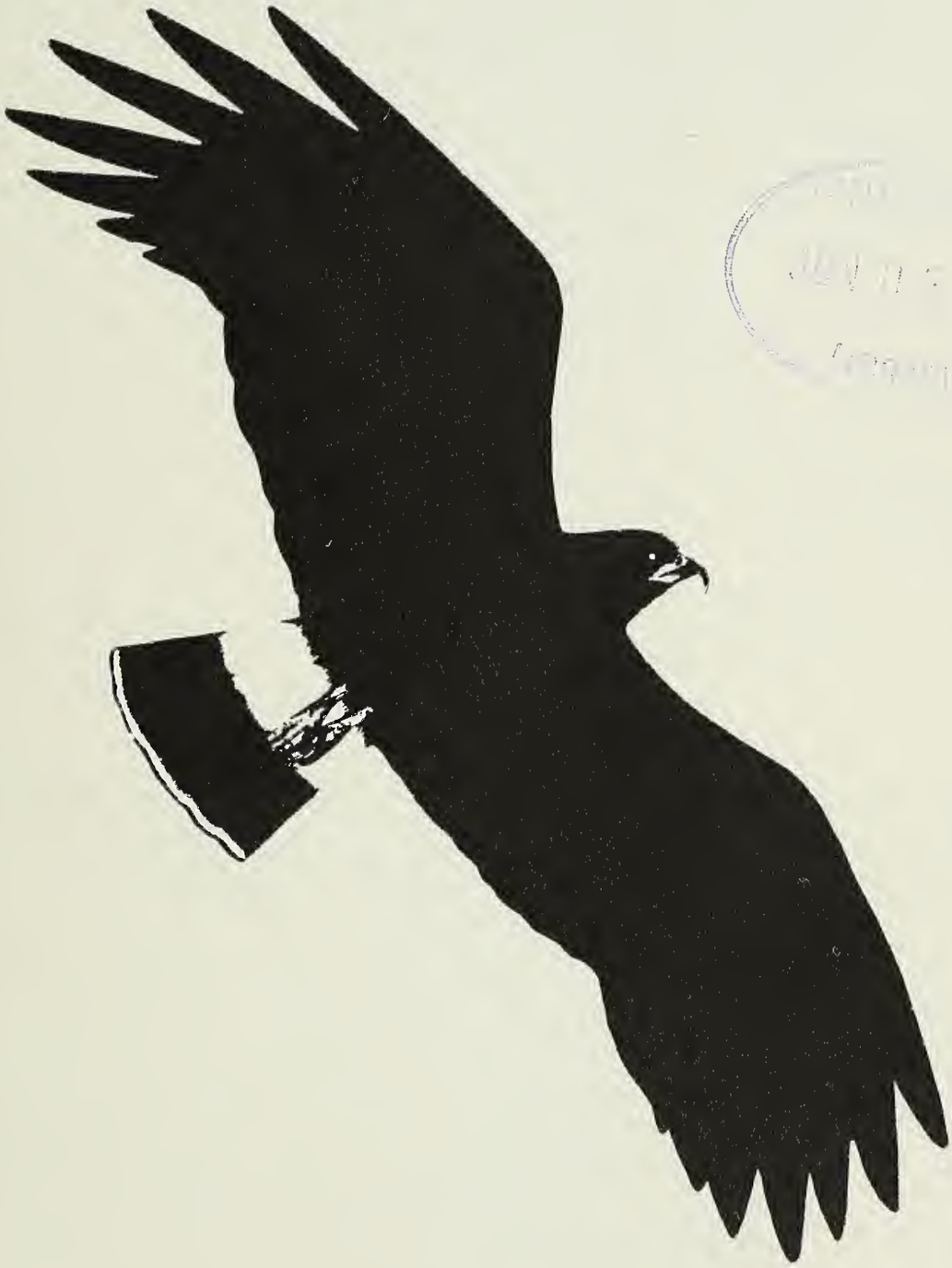

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AVIFAUNA OF HAMMOCKS AND SWAMPS ON JOHN F. KENNEDY SPACE CENTER

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Abstract.—Birds were surveyed in oak-cabbage palm hammocks, red bay, live oak and laurel oak hammocks, hardwood swamps, and willow swamps on John F. Kennedy Space Center using the variable distance circular plot method to determine the importance of such habitats for use in environmental impact assessment. The Carolina Wren (*Thryothorus ludovicianus*) and Northern Cardinal (*Cardinalis cardinalis*) were the two most abundant breeders in all woodland types. Breeders characteristic of interior central Florida were rare and did not nest in the study areas. Broad-leaved woodlands are important for the maintenance of regional avian diversity for much of coastal Florida, because several breeders, such as Red-shouldered Hawks (*Buteo lineatus*) and Barred Owls (*Strix varia*), nest primarily within these woodlands. These species have large territory sizes and occur in low densities, characteristics which must be considered in regional land-use planning if minimum population sizes are to be maintained.

Few studies have been conducted on land bird community composition as it relates to different vegetation types in Florida (Rowher and Woolfenden 1969, Robertson and Kushlan 1974, Hirth and Marion 1979). Bird composition in broad-leaved woodlands in peninsular Florida was investigated by Robertson (1955), Woolfenden (1967; 1968a, b), Rowher and Woolfenden (1969), Kale and Webber (1968a, b; 1969a, b), and Cutright (1981). These studies have shown a breeding avifauna characteristic of woodlands impoverished in both species richness and density when compared to woodlands north of Florida.

The number of breeding bird species in woodlands declines southward along the peninsula. Also, many species nest farther south in the interior rather than along the coasts (Robertson 1955, Rowher and Woolfenden 1969, Robertson and Kushlan 1974, Emlen 1978). These distribution trends may occur because tropical species are deterred from northern movements by physiographic barriers and continental species may be poorly adapted to conditions of the peninsula (Robertson 1955, Rowher

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and Woolfenden 1969). These trends indicate that the determination of bird composition in woodlands for specific areas may require site-specific surveys.

Several different types of woodlands have been mapped on John F. Kennedy Space Center (KSC) for land-use planning and long-term environmental monitoring purposes (Provancha et al. 1986a). A one-year survey was conducted to determine seasonal bird assemblages at a possible construction site having four woodland types on KSC. This survey was followed by another one-year survey to determine seasonal bird assemblages for the same four woodland types adjacent to other operational areas on KSC. The objective of this paper is to characterize avian composition within these woodlands and compare the avian composition to composition expected (Breininger, unpublished KSC wildlife habitat association model) from range maps and studies conducted elsewhere in Florida.

Study Area and Methods

Marshes, scrub, flatwoods, hammocks, and swamps dominate much of the landscape at KSC (Sweet et al. 1979, Stout 1980). The KSC consists of 57,000 ha of land and lagoonal waters and is located on the northern part of Merritt Island on the east coast of central Florida. Areas of KSC not being used by the space program are managed as Merritt Island National Wildlife Refuge. Several subtropical and temperate faunal and floral assemblages occur together on KSC (Provancha et al. 1986b). This area has been mapped as a transition zone between a temperate broad-leaved evergreen forest and tropical forest (Greller 1980). Cypress swamps do not occur on KSC, and mangrove swamps have been greatly impacted by recent freezes (Provancha et al. 1986b).

Two types of hammocks and two types of freshwater swamps were surveyed to describe avian composition. All four of these cover types are common and are the predominant broad-leaved woodlands on KSC (Provancha et al. 1986a). Oak-cabbage palm hammock (OCP) has a canopy typically dominated by live oak (*Quercus virginiana*), but cabbage palm (*Sabal palmetto*), laurel oak (*Quercus laurifolia*), elm (*Ulmus americana*), and red mulberry (*Morus rubra*) also occur. Shrubs of tropical affinity typically dominate the understory (Schmalzer and Hinkle, unpublished report). Red bay-live oak-laurel oak hammock (RBL) has a canopy dominated by live or laurel oak, but redbay (*Persea borbonia*) often occurs. The understory is typically dominated by saw palmetto (*Serenoa repens*). Hardwood swamps are typically dominated by deciduous species, especially red maple (*Acer rubrum*), although elm and persimmin (*Diospyros virginiana*) may be common. These swamps often include evergreen taxa such as laurel oak and cabbage palm. Ferns are often abundant in the understory (Schmalzer and Hinkle, unpublished report). Willow swamps are dominated by small deciduous Carolina willow (*Salix caroliniana*) trees. However, red maple and wax myrtle (*Myrica cerifera*) are often present. The understory is often dominated by aquatic plants such as arrowhead (*Sagittaria stagnorum*). This cover type occurs in deeper water and on sites with longer hydroperiods than hardwood swamps (Schmalzer and Hinkle, unpublished report).

The variable circular plot (VCP) method (Reynolds et al. 1980) was used to sample avifauna in two separate surveys. The method was selected for its advantages in patchy habitat, large geographic areas, rugged terrain, and to allow sampling across a large variation of habitat conditions. It also was selected for its perceived advantages in long-term

monitoring of a large number of sites having several patches of different vegetation types. This study could then be used as a pilot study for development of a long-term environmental monitoring tool. The first survey was conducted from June 1983 to May 1984; the second survey was conducted from March 1985 to February 1986. Stations for the first survey were centrally located on KSC and each was sampled 22 times, about every 22 days. Stations for the second survey were located throughout KSC south of Route 402 and each station was sampled eight times, about every 46 days. These surveys excluded the northern one-third of KSC.

Both surveys involved sampling routes consisting of stations in many different cover types. Routes were comprised of eight stations arranged in a roughly elliptical pattern about 200 m apart. Six routes were used in the first survey and 15 in the second. Both studies used routes that included stations located within vegetation types other than woodlands.

Counts were made for seven minutes at each station; pause time was not used after arriving at a station since birds detected upon arrival were not always detected again (Anderson and Ohmart 1981). All birds seen or heard were recorded except those flying over the area without landing. Distances were usually estimated, although a rangefinder was used periodically to keep the investigator calibrated. One month was used to practice the technique prior to the first survey. Surveys were conducted between one-half hour before sunrise to three hours after sunrise. No surveys were conducted during rain or windy conditions. Data from both surveys were grouped into the four cover types for the determination of the effective detection distance (x). The x-value was determined for each species in each cover type by estimating the inflection point of a graph of the number of birds in concentric 10 m bands, according to the criteria of Reynolds et al. (1980).

Estimates of birds/ha were calculated by summing the number of detections within x, dividing by the number of visits and πx^2, and multiplying by 10,000. Estimates of density were calculated for all species where the number of detections for both surveys combined was ≥ 40 (Burnham et al. 1981) within a cover type. Estimates were calculated for arbitrary seasons which were spring (Mar, Apr, May), summer (Jun, Jul, Aug), fall (Sep, Oct, Nov), and winter (Dec, Jan, Feb) separately for both studies. The mean number of birds/visit was calculated for every species in each cover type by summing the total number of detections for both studies and dividing by the number of visits.

Two-way and three-way factorial analysis of variance (ANOVA) models were used to test whether each species differed by year, season, or habitat. An alpha level of 0.05 was used for tests of significance. Differences discussed below are based on ANOVA. In no cases were interaction terms significant.

RESULTS

The Carolina Wren (*Thryothorus ludovicianus*) and Northern Cardinal (*Cardinalis cardinalis*) were the most frequently occurring (Table 1) and most abundant (Table 2) breeding birds, representing the only species sighted enough to allow the estimation of density in all four cover types. Both were significantly ($P<0.05$) more abundant in the first study year (1983-1984) than in the second (1985-1986). Carolina Wren densities were significantly higher in spring than in fall and winter; densities were significantly higher in summer than in winter, but not fall. Northern Cardinal densities were significantly higher in spring and summer than in fall and winter. Densities between spring and summer or fall and winter were not significantly different for either species.

Table 1. Mean birds/visit in hammocks and swamps on John F. Kennedy Space Center, Florida, 1983-1986.[1,2]

Species	Hammocks		Swamps	
	Live oak, cabbage palm (N = 178)	Redbay, laurel & live oak (N = 160)	Mixed hardwood (N = 136)	Willow (N = 68)
Breeding residents				
Carolina Wren	0.98	0.76	0.62	0.66
Northern Cardinal	0.54	0.58	0.47	0.54
White-eyed Vireo	<0.03	0.35	0.18	0.19
Blue Jay	0.06	0.14	0.09	0.20
Red-bellied Woodpecker	0.12	0.04	0.04	0.12
Pileated Woodpecker	0.10	0.01	0.03	
White Ibis[4]	0.01		0.09	0.29
Common Grackle[3]	0.04	0.09	0.05	0.09
Yellow-billed Cuckoo	0.02	0.01	0.05	0.06
Red-shouldered Hawk	0.07	0.04	0.05	<0.01
Black Vulture	<0.01	0.02	0.07	
Rufous-sided Towhee		0.06	0.01	
Winter visitors				
Yellow-rumped Warbler	0.17	0.40	0.57	0.68
American Robin	0.22	0.19	0.41	0.38
Gray Catbird	0.04	0.29	0.13	0.22
Common Yellowthroat[5]	<0.01	0.02	0.05	0.10
Ruby-crowned Kinglet	0.01	0.09	0.03	

[1]Includes all species with > 0.05 birds sighted/visit.
[2]N = total number of visits.
[3]Probably do not nest in these habitats.
[4]Sometimes nest in swamps but did not nest in the swamps surveyed in this study.
[5]All or nearly all individuals were nonbreeders.

White-eyed Vireos (*Vireo griseus*) were of sufficient abundance only in RBL hammocks to allow density estimates (Table 1). Densities also were significantly higher the first year (1983-1984) than the second (1985-1986), but seasonal densities were not significantly different. No other breeding birds were abundant enough to allow density estimation.

Some breeding birds (e.g., Blue Jays *Cyanocitta cristata* and Red-bellied Woodpeckers *Melanerpes carolinus*) were often seen in all four types, whereas, others (Pileated Woodpeckers *Dryocopus pileatus*) appeared to be more restricted to particular cover types (Table 1). White Ibises (*Eudocimus albus*), which nested elsewhere on KSC, occasionally used hardwood and willow swamps for feeding and roosting and OCP hammocks for roosting. Red-shouldered Hawks (*Buteo lineatus*) were observed nesting in OCP hammocks and hardwood swamps where there were large trees, but appeared to use all four woodlands during hunting

activities. Yellow-billed Cuckoos (*Coccyzus americanus*) were most frequently seen in swamps. Black Vultures (*Coragyps atratus*) were sighted in all but willow swamps and have been observed nesting in RBL hammocks. The Green-backed Heron (*Butorides striatus*), Barred Owl (*Strix varia*), and Northern Flicker (*Colaptes auratus*) were the only additional resident breeders observed nesting in or along the edges of woodlands. The Cooper's Hawk (*Accipiter cooperii*) was rarely sighted in both surveys. Rufous-sided Towhees (*Pipilo erythrophthalmus*) frequented the edges of woodlands, especially in RBL hammocks, but nested in the adjacent scrub habitats.

The Yellow-rumped Warbler (*Dendroica coronata*) was the most abundant winter resident in all but OCP hammocks, where it did not occur often enough to allow density estimation (Table 2). Densities were not significantly different among the other three cover types or between years. Densities were significantly higher in winter than in fall and spring. Densities between fall and spring were not significantly different. No significant differences occurred between habitat types for the Gray Catbird (*Dumetella carolinensis*) although densities were significantly higher in the first year than the second. No significant differences occurred among the other three seasons. The American Robin (*Turdus migratorius*) was sighted in the four types, but only abundantly enough in OCP hammocks and hardwood swamps to allow density estimations (Table 2); densities between the two types were not significantly different. Densities were significantly different between years. The Common Yellowthroat (*Geothlypis trichas*) was most common in willow and hardwood swamps (Table 1). Nearly half of the stations in hardwood swamps lacked an understory and these were devoid of Common Yellowthroats. Ruby-crowned Kinglets (*Regulus calendula*) were occasionally sighted along edges, particularly in RBL hammocks.

DISCUSSION

The Carolina Wren, Northern Cardinal, White-eyed Vireo, Yellow-rumped Warbler, and Gray Catbird were the only species abundant enough to allow density estimation. They occupy a broad variety of habitat conditions (Hamel et al. 1982). This, combined with their high seasonal and yearly variation, suggests that it would be difficult to use their VCP densities as indicators of environmental change. Seasonal differences in density that occurred were probably affected more by differences in observability rather than differences in actual density for the permanent residents. Seasonal changes in observability have been described for many species (Best 1981, Ekman 1981). Reasons for yearly differences are unknown; they may include actual differences in sites where the surveys occurred or yearly variations in population sizes due to disease, food availability, or weather. The sites studied during the

Table 2. Density estimates (birds/ha) of birds in hammocks and swamps on John F. Kennedy Space Center, Florida, 1983-1986.[1]

	Hammocks				Swamps			
	Live oak, cabbage palm		Redbay, live & laurel oak		Mixed hardwood		Willow	
	1983-1984 (N = 3)	1985-1986 (N = 14)	1983-1984 (N = 4)	1985-1986 (N = 9)	1983-1984 (N = 4)	1985-1986 (N = 6)	1983-1984 (N = 2)	1985-1986 (N = 3)
Spring								
Carolina Wren	2.6	1.6	2.8	1.8	1.6	1.3	5.2	2.6
Northern Cardinal	1.7	1.0	1.6	1.3	1.3	1.2	2.2	2.6
White-eyed Vireo	0.0	0.0	2.5	0.3	0.0	0.0	0.0	0.0
Yellow-rumped Warbler	0.0	0.0	3.4	1.8	0.8	0.0	0.0	1.3
Gray Catbird	0.0	1.0	0.3	0.3	0.0	0.0	0.0	0.0
Totals	4.3	3.6	10.6	5.5	3.7	2.5	7.4	6.5
Summer								
Carolina Wren	3.0	1.1	1.1	0.9	2.2	1.3	1.5	2.0
Northern Cardinal	2.1	0.2	0.9	1.2	1.4	0.8	1.4	0.0
White-eyed Vireo	0.0	0.0	1.4	0.5	0.0	0.0		
Totals	5.1	1.3	3.4	3.6	3.6	2.1	2.9	2.0
Fall								
Carolina Wren	3.6	0.7	1.1	0.9	0.9	0.7	1.0	1.2
Northern Cardinal	1.2	0.3	0.8	0.8	0.5	0.4	0.6	0.8
White-eyed Vireo	0.0	0.0	1.6	0.2	0.0	0.0	0.0	0.0
Yellow-rumped Warbler	0.0	0.0	0.0	0.0	0.0	0.0	9.6	8.0
Gray Catbird	0.0	0.0	0.8	0.4	0.0	0.0	0.0	0.0
Totals	4.8	1.0	4.3	2.3	1.4	1.1	11.2	10.0

Winter								
Carolina Wren	0.8	1.1	2.8	0.7	0.6	0.2	0.0	0.6
Northern Cardinal	0.8	0.8	0.6	0.3	0.3	0.8	0.2	0.0
White-eyed Vireo	0.0	0.0	1.3	0.4	0.0	0.0	0.0	0.5
Yellow-rumped Warbler	0.0	0.0	15.5	0.0	14.6	16.1	3.5	6.8
Gray Catbird	0.0	0.0	1.6	0.2	0.0	0.0	0.0	0.0
American Robin	1.0	1.2	0.0	0.0	2.4	2.1	0.0	0.0
Totals	2.6	3.1	21.8	1.6	17.9	19.2	3.7	7.9

[1]N refers to the number of stations.

first study had a dense understory and subcanopy, but many stations during the second study had little understory and subcanopy. No data were collected to measure these differences. Population fluctuations have been described for many species (Holmes et al. 1986). Caution must be exercised when interpreting data from different years and seasons (Anderson et al. 1981), particularly with the accuracy of the results when total mapping procedures of color-banded birds are not used as a method to determine absolute density (Verner 1985).

There were many additional species observed in woodlands on KSC. They were not detected abundantly enough to allow density estimation, suggesting that the utility of the VCP method is limited in these habitats. Although breeding bird population densities for Florida broad-leaved forests and forest edge are markedly lower than for the adjacent southeastern coastal plain, this is apparently not true for pine flatwoods (Robertson and Kushlan 1974) and some scrub habitats (Breininger and Schmalzer 1990). The mean number of birds sighted per visit in hammocks and swamps was always several times lower than the mean number of birds sighted per visit in scrub for all seasons and across all habitat types, except for recently burned scrub. The utility of the VCP method may therefore vary by habitat type.

Species such as the Northern Parula (*Parula americana*), Blue-gray Gnatcatcher (*Polioptila caerulea*), and Red-eyed Vireo (*Vireo olivaceus*) that are abundant breeders in interior woodlands (Woolfenden 1967) but not coastal woodlands in central Florida (Kale and Webber 1968a, b, 1969a, b; Rowher and Woolfenden 1969) were not sighted in this study during the nesting season. The KSC is within the suggested breeding range of many other species (Robertson 1955, Hamel et al. 1982) that were not observed nesting in woodlands on KSC in this study. Differences in avifauna may occur between the east and west Florida coastline. Yellow-billed Cuckoos were common on the west coast (Rowher and Woolfenden 1969) but were not common in this study or in another woodland on the east coast (Kale and Webber 1968a, b; 1969a, b).

Most of the breeding birds found within these woodlands on KSC also are found in adjacent habitats, often in similar or higher densities (Breininger and Schmalzer 1990). Bald Eagles (*Haliaeetus leucocephalus*), Great Crested Flycatchers (*Myiarchus crinitus*), and Downy Woodpeckers (*Picoides pubescens*) can use hammocks or swamps for nesting, but they use mostly pinelands. Most wading birds nest in mangroves or on spoil islands and feed much more abundantly in other habitats (Breininger and Smith, unpublished data).

Broad-leaved woodlands are important for the maintenance of regional populations of Red-shouldered Hawks, Cooper's Hawks, Barred Owls, Pileated Woodpeckers and possibly Black Vultures and Turkey Vultures (*Cathartes aura*). These species occupy large feeding territories

(Schoener 1969), occurring in low densities and occupying higher trophic levels. This study and other unpublished data confirm observations by Cruickshank (1980) who suggested that Barred Owls and Red-shouldered Hawks are characteristic of hammocks and swamps, whereas, Great Horned Owls and Red-tailed Hawks are characteristic of pinelands in Brevard County. The Cooper's Hawk was seen and heard giving nest defense calls (Bent 1937) almost on a daily basis in the late winter and spring of 1988 and 1989 in several woodlands on KSC (D. Breininger and B. Smith, pers. obs.).

Since many of the neotropical migrants that are area-sensitive breeders (Robbins 1979, 1980; Whitcomb et al. 1981; Hamel et al. 1982) do not breed in much of the Florida peninsula, relationships with woodland size are often associated with minimum territory size requirements (O'Meara 1984). Several species can utilize small islands that are part of a group of islands large enough to meet habitat requirements (Harris and Wallace 1984, O'Meara 1984, Gutzwiller and Anderson 1987, Bushman and Therres 1988). Others such as the Red-shouldered Hawk, Barred Owl and Pileated Woodpecker may require larger tracts (Craighead and Craighead 1956, Hamel et al. 1982).

Bird use was not uniform across the four woodland types in this study or in a north Florida hammock (Noss 1988). Habitat features such as hydrology, tree size, availability of nest cavities, and the cover by deciduous and evergreen canopy all vary among woodland types. Red-shouldered Hawks require large trees for nesting (Bushman and Therres 1988). Barred Owls often prefer areas associated with water, but this may occur due to a need for large trees with cavities, which are often associated with these areas, and not that Barred Owls are attracted to water itself (Devereux and Mosher 1984). Pileated Woodpeckers choose foraging habitats having high densities of logs and snags, dense canopies, and tall shrub cover (Bull and Meslow 1977) and require large snags for nesting (Bull 1981). Most studies regarding breeding habitat for woodland species have been conducted outside Florida where habitat requirements may differ (Gutzwiller and Anderson 1987). There has been little study conducted to quantify habitat requirements of these species in Florida and the availability of these features in Florida woodlands.

Florida woodlands support higher avian density and biomass values during the winter than during the summer breeding season, unlike northern areas (Harris and Vickers 1984). Wintering species abundant in KSC woodlands, such as Yellow-rumped Warblers, Gray Catbirds, and American Robins, are abundant in several other KSC habitats. Common Yellowthroats use woodlands but are much more abundant in other habitats such as scrub (Breininger and Schmalzer 1990). Hermit Thrushers (*Catharus guttatus*), Black-and-white Warblers (*Mniotilta varia*), and Ovenbirds (*Seiurus aurocapillus*), wintering locally in hammocks and

swamps, (Cruichshank 1980) were not abundant. Many transients pass through KSC (Taylor and Kershner 1986), including hammocks and swamps (Cruickshank 1980), during migration. Such transient species can occur in large numbers during short periods but these events can easily be missed, as occurred in this study. Woodland size has been found to effect wintering bird composition in urban woodlands (Tilghman 1987). Cox (1988) suggested that large tracts of maritime hammocks may be important during brief periods when large numbers of migrants pass through the area. Alteration of nonbreeding habitat may have greater impact on populations than alteration of breeding habitat because many migratory species concentrate outside their breeding habitat (Terborgh 1980). Many overwintering species spend more time in Florida than they spend on their northern breeding grounds (Keast 1980).

Results of this study suggest that common bird community survey methods, used on a local scale for determination of conservation value, provide limited information regarding the importance of woodlands for maintaining biological diversity. Maintenance of biodiversity has been identified as a primary issue in natural resource management (Thomas and Salwasser 1989). Future surveys in broad-leaved woodlands on a local scale might best focus on methods that provide information on the abundance and distribution of species that require woodlands in Florida, as well as their habitat requirements and the distribution of the required habitat features.

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NOTES

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Recent Records and Survey Methods for the Black Rail in Florida

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A tiny and elusive bird, the Black Rail (*Laterallus jamaicensis*) inhabits dense emergent vegetation, wet meadows, moist soil, and high fresh and salt marshes (Eddleman et al. 1988). Rarely encountered, even by dedicated bird watchers, very little is known about the population status and distribution of this rail in Florida. Due to their small size, Black Rails are usually confined to shallow water or moist soil marshes (W. Eddleman, pers. comm.). These narrow habitat tolerances make Black Rails susceptible to well planned and tightly focused surveys.

The Florida Game and Fresh Water Fish Commission's Nongame Wildlife Program recently reviewed 670 vertebrate taxa in the state and ranked them according to their biological vulnerability and the current state of knowledge regarding their distribution and status (Millsap et al., in press). The Black Rail ranked fifth on a resulting list of priority taxa judged potentially vulnerable to extirpation for which current data on distribution are limited. Until such basic information is available, little can be done to protect or manage the Black Rail in Florida.

Because of the cryptic nature of rails and the dense vegetation typical of their habitats, aural surveys have become the principal means of surveying rail populations. Playing taped calls increases the calling rate of several rail species (see Glahn 1974, Johnson and Dinsmore 1986). Previous studies of the Black Rail in the western United States by Repking and Ohmart (1977), Manolis (1978), Evens et al. (1986), and Eddleman (pers. comm.) laid the groundwork for this pilot survey. Our goal was to evaluate the feasibility of using systematic aural surveys to determine the current distribution of the Black Rail in Florida's vast expanses of high elevation marsh. We located several accessible survey sites in upper tidal marshes along Florida's western and northern Gulf Coast, and two freshwater marshes in east-central Florida (see Table 1). We conducted 31 surveys at 15 different tidal or freshwater marshes in north and central Florida between March and July, 1989.

Surveys consisted of call count routes, with 10-30 stations spaced 60-100 m apart. Tape recordings of the *ki ki doo* call followed by the *grrr* call (Reynard 1974, Hardy 1986) were played for 2 minutes at each call count station. One or two observers listened for a response for at least 1 minute before moving to the next station. Call count routes varied in length and configuration depending upon the size and configuration of the marsh, water depths, and presence of deep tidal channels. Transects were feasible in the freshwater marshes, and along dikes or roads; but, routes in tidal marshes varied greatly in orientation and

Table 1. Results of Black Rail call count surveys in north and central Florida, 1989.

Site name	County	Latitude	Longitude	Survey date	No. rails detected
Lake Woodruff NWR[1]	Volusia	29° 06.5′	81° 23′	01 May	0
				23 May	1
				30 Jun	0
St. Johns NWR	Brevard	28° 33′	80° 54′	02 May	4-6
				24 May	1
				30 Jun	1
St. Vincent NWR	Franklin	29° 41.0′	85° 07.0′	04 Apr	1
		29° 40.5′	85° 06.5′	04 Apr	1
				05 Apr	0
		29° 39.2′	85° 05.7′	24 Apr	3
		29° 39.8′	85° 05.3′	25 Apr	5
St. Marks NWR	Wakulla	30° 06.5′	84° 06.5′	26 Apr	1-2
				27 Apr	0
				28 Apr	0
Porter Island		30° 01′	84° 22′	24 May	1
Mashes Island		29° 58.5′	84° 21.5′	25 May	0
Wakulla Beach		30° 06.5′	84° 15.5′	25 May	0
Jena WMA[2]	Dixie	29° 32′	83° 23′	07 Jun	5
		29° 32′	83° 22′	27 Jul	1
Big Bend WMA (Tide Swamp Unit)	Taylor	29° 40.5′	83° 25.0′	16 Mar	1
		29° 47.5′	83° 34.0′	16 Mar	1
		29° 46.5′	83° 33.8′	26 Jul	1
Total					28-31

[1]U. S. Fish and Wildlife Service National Wildlife Refuge.
[2]Florida Game and Fresh Water Fish Commission Wildlife Management Area.

length. Here we had our best success along irregular marsh-upland edges. Shallow freshwater marshes were surveyed between 2100 and 0430 hr (DST); tidal marshes were surveyed at various times during the night or in the morning to coincide with high tides. By surveying coastal marshes at high tide, we suspect that the probability of detecting Black Rails was increased as they likely concentrated in the shallow upper edges of marshes.

We detected between 28 and 31 individual Black Rails (Table 1) in areas of high marsh with moist soil or shallow (≤4 cm) water. We saw only one Black Rail. We successfully detected Black Rails in both fresh and salt marshes during both morning and night surveys. Encounters were too few to determine which period is most efficient, but we believe that future surveys of tidal marshes should coincide with high tides in either the late evening or early morning hours. Surveys during high spring tides may be most successful. Because loud night time choruses of anurans can invalidate aural surveys for rails, future surveys of fresh marshes may best be conducted in the early morning. Conducting night time surveys during periods of drought or high atmospheric pressure may help to minimize this problem as well.

On calm nights and mornings, the 100 m spacing of call stations seemed acceptable for auditory observations. Informal tests of the audibility of the taped calls played at full volume suggested that this distance was not excessive; on calm quiet nights taped calls were audible for up to 150 m.

Carefully planned aural surveys using tape recorded calls appear to be an effective and efficient method to determine presence of Black Rails in extensive marsh systems. Further use of this method will readily provide new information on Black Rail distribution. Further extensive surveys are needed to determine the current status and distribution of this elusive bird. If future surveys suggest declines in abundance or distribution and population monitoring is deemed necessary, additional research will be necessary to refine the call count method. Our technique detects only the presence of calling rails. Information on presence or absence, relative abundance, or density will require detailed studies on the calling and response behavior of Black Rails (e.g., Glahn 1974, Evens et al. 1986, Kaufmann 1988). Three areas with potentially large breeding populations of Black Rails in Florida that appear suitable for such studies are the St. Vincent and St. Johns National Wildlife Refuges and Jena Wildlife Management Area (Table 1).

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Unusual Peregrinations of a Sandhill Crane Banded in Florida

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The occurrence of Sandhill Cranes (*Grus canadensis*) east of the Appalachian Mountains is unusual. Walkinshaw (1949, 1960) lists several records for the region and, since his writings, periodic sightings of Greater Sandhill Cranes (*Grus canadensis tabida*) along the eastern seaboard continue to be reported from New Jersey to South Carolina (Davis 1958; Dick 1965, 1967; Wood and Wood 1971; Conway 1976; Kirkwood 1982; Vaughn 1982). These records are well east of the typical wintering, migration, and nesting range for the eastern Greater Sandhill Crane population (Walkinshaw 1960, Nesbitt and Williams 1979, American Ornithologists' Union 1983). The fate of such extralimital individuals is usually unknown, and it is supposed they do not return to their traditional range and are lost from the population.

A juvenile Greater Sandhill Crane captured, banded (USF&WS #608-55661), and distinctly color marked (Nesbitt et al., in press) near Gainesville, Alachua County, in Florida (1 March 1985) was seen from 14 November 1986 to 20 January 1987 at Cape May, Cape May County, New Jersey (D. Ward Jr., pers. comm.). Then from 12 February until 5 March 1987, it was observed near Kirwan Creek on Kent Island, Queen Annes County, Maryland (R. J. Limpert, pers. comm.). The bird's age at this time was 2.50 to 2.75 years. At both these locations, the bird was reported to use "corn fields, natural meadows and small ponds" (R. J. Limpert and D. Ward Jr., pers. comm.).

From 27 August to 27 September 1987, the bird was seen near Massey, Ontario, Canada (R. Urbanek, pers. comm.), and from 2 October to 8 October 1987 it was observed near Pickford, Mackinac County, Michigan (R. Urbanek, pers. comm.). In Ontario and Michigan, the bird was seen associating with other Sandhill Cranes.

When beyond their normal range and without conspecifics to flock with, both Snow Geese (*Chen caerulescens*) and Canada Geese (*Branta canadensis*) as well as Tundra Swans (*Cygnus columbianus*) join with Sandhill Cranes during feeding, roosting, and loafing (Nesbitt 1975a, pers. obs.), so it might be expected that cranes would associate with geese when beyond their normal range. Neither in New Jersey nor in Maryland was the crane seen to associate closely with geese or any other birds (R. J. Limpert and D. Ward, Jr., pers. comm.). Of the other recent extralimital sightings of Sandhill Cranes, only Vaughn (1982) mentions that the bird he saw on 17 January 1977 was associating with geese: "flying in formation with 15 Snow Geese," then later "seen by others feeding with a flock of Snow Geese."

The typical first arrival date for Greater Sandhill Cranes that over-winter in Florida is late October or early November (Nesbitt et al., in press) which coincides with the first sighting of the crane in New Jersey. The last sighting of the crane in Maryland was 5 March 1987. Spring departure of Greater Sandhill Cranes from Florida usually begins in late February or early March (Nesbitt 1975b). The crane, banded during its first winter, spent its third winter as a solitary bird in New Jersey and Maryland, well east and north of the traditional wintering area for eastern Greater Sandhill Cranes. By late summer, the bird had rejoined others of its subspecies within the traditional range for the subspecies. The winter spent outside traditional range did not apparently affect the ultimate value of this individual since it may now be a functional (reproductive) contributor to the population.

I am indebted to D. Ward Jr., R. J. Limpert and R. Urbanek for reporting their sightings of this errant individual and sharing information on its behavior and activities.

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ERRATUM

In "Breeding range expansions of the Indigo Bunting, Painted Bunting, and Blue Grosbeak in Florida with new records for Seminole County" by W. K. Taylor, B. H. Anderson, and H. M. Stevenson (1989, Florida Field Naturalist 17(1): 1-10), on page 8, line 8, ". . . male with young. . . ." should read ". . . juvenile male. . . ."

Florida Field Naturalist 18(2): 21-32, 1990.

Florida Birds in the Periodical Literature

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This list contains 88 citations to recent (1987-1989), and 1 overlooked from 1977, articles about Florida birds except those published in *Florida Field Naturalist* and the seasonal reports in *American Birds*. Authors are encouraged to send reprints of their articles to the compiler for inclusion in this annual feature.

Alexander, L. L. 1988. Patterns of mortality in wintering Common Loons. Pp. 77 *in* Papers from the 1987 Conference on Loon Research and Management (Strong, P. I. V., ed.). North American Loon Fund, Meredith, New Hampshire.—Summary of oral presentation based on autopsy of 700 birds found dead along the northern Gulf of Mexico coast (presumably includes Florida) 1983-1987.

Anonymous. 1989. Regional reports pictorial highlights autumn 1988. Am. Birds 43: 25-28.—Includes photo of Vermilion Flycatcher, October 1988, Sun City Center, by Lee F. Snyder.

Anonymous. 1989. Regional reports pictorial highlights winter 1988-1989. Am. Birds 43: 230-233.—Includes photos of Bananaquit, 10 February 1989, Lloyd State Park, and Cassin's Kingbird, 5 January 1989, Loxahatchee NWR; both by Ted Robinson.

Anonymous. 1989. Regional reports pictorial highlights spring 1989. Am. Birds 43: 395-396.—Includes photo of Bahama Mockingbird, 11 April 1989, near Miami, by Max Parker.

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Atkins, A. 1989 (1987). Blue Jay imitates Osprey (vocalizations). Oriole 52: 48.—On Cedar Key, Levy Co., 1 April 1987; fooled the author!

Atkinson, C. T. 1988. Epizootiology of *Haemoproteus meleagridis* (Protozoa: Haemosporina) in Florida. J. Med. Entomol. 25: 39-44.—Wild Turkey blood parasite.

Avise, J. C., and W. S. Nelson. 1989. Molecular genetic relationships of the extinct Dusky Seaside Sparrow. Science 243: 646-648.—Based on mitochondrial DNA; Dusky closely related to Atlantic coast Seasides but not to Gulf Coast populations.

Baker, W. W. 1989. Winter bird population study. 2. Mature beech-magnolia forest. J. Field Ornithol. 60(suppl.): 7-8.— Leon Co., Tall Timbers Res. Stn.

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Bishop, M. A., and M. W. Collopy. 1987. Productivity of Florida Sandhill Cranes on 3 sites in central Florida. Pp. 257-263 *in* Proceedings 1985 Crane Workshop (Lewis, J. C., ed.). Platt River Trust, Grand Island, Nebraska.—Kissimmee Prairie (Osceola and Okeechobee Co.), Myakka River State Park (Sarasota and Manatee Co.), and C. M. Webb Wildl. Mgmt. Area (Charlotte Co.).

Bowman, R., G. V. N. Powell, J. A. Hovis, N. C. Kline, and T. Wilmers. 1989. Variation in reproductive success between subpopulations of the Osprey (*Pandion haliaetus*) in south Florida. Bull. Mar. Sci. 44: 245-250.—In the Keys, Monroe Co.

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KING, B. 1987. Caspian Terns predating other seabirds and stealing fish from man. Sea Swallow 36: 67-68.—In Florida.

KLIMLIEWICZ, M. K., AND A. G. FUTCHER. 1989. Longevity records of North American birds supplement 1. J. Field Ornithol. 60: 469-494.—Includes the following birds banded and recovered in Florida: Wood Stork, 6 yr, Snail Kite, 7 yr, Broad-winged Hawk, 18 yr, Crested Caracara, 8 yr 11 months, and Seaside Sparrow, also 8 yr 11 months.

L'ARRIVEE, L. L., AND H. BLOKPOEL. 1988. Seasonal distribution and site fidelity in Great Lakes Caspian Terns. Colon. Birds 11: 202-214.—Three maps (migration, winter, sub-adults) show 69 recoveries from Florida.

LAND, D., W. R. MARION, AND T. E. O'MEARA. 1989. Snag availibility and cavity nesting birds in slash pine plantations. J. Wildl. Manage. 53: 1165-1171.—North-central Florida.

LEE, D. S. 1989. Jaegers and skuas in the western North Atlantic: some historical misconceptions. Am. Birds 43: 18-20.—Mentions: specimen (UF20488) of immature Long-tailed Jaeger salvaged 1 September 1979 at St. Augustine after Hurricane David and reported as a Parasitic Jaeger in *Amer. Birds* 34: 153; and another Long-Tailed specimen from the Gulf Coast originally reported by Scott (1889) as a Parasitic (locality not mentioned) from Gulf Coast.

LOFTIN, R. W. 1989. Winter bird population study. 14. Barrier beach and saltwater estuary. J. Field Ornithol. 60(suppl.): 7-8.—Duval Co., N side St. Johns River.

LOGAN, T. H., AND S. A. NESBITT. 1987. Status of Sandhill and Whooping crane studies in Florida. Pp. 213-216 *in* Proceedings 1986 Crane Workshop (Lewis, J. C., ed.). Platt River Trust, Grand Island, Nebraska.—At Paynes Prairie, Alachua Co.

MCDONALD, M. V. 1989. Function of song in Scott's Seaside Sparrow, *Ammodramus maritimus peninsulae*. Anim. Behav. 38: 468-485.—As studied near Cedar Key, Levy Co.

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POST, W., AND J. S. GREENLAW. 1989. Metal barriers protect near-ground nests from predators. J. Field Ornithol. 60: 102-103.—In Florida, galvanized sheet metal reduces nest predation by rice rats on Seaside Sparrows.

POWELL, G. V. N., R. D. BJORK, J. C. OGDEN, R. T. PAUL, A. H. POWELL, AND W. B. ROBERTSON. 1989. Population trends in some Florida Bay wading birds. Wilson Bull. 101: 436-457.—Roseate Spoonbill, Reddish Egret, and Great White Heron.

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TURNBULL, R. E., F. A. JOHNSON, M. A. HERNANDEZ, W. B. WHEELER, AND J. P. TOTH. 1989. Pesticide residues in Fulvous Whistling-Ducks from south Florida. J. Wildl. Manage. 53: 1052-1057.—Birds collected in Palm Beach Co.

VAN VELZEN, W. T., AND A. C. VAN VELZEN. 1989. Fifty-second breeding bird census. Am. Birds 43: 184-186.—Includes notice of: Baker, W. W. 25. Mature beech-magnolia forest, Leon Co., Tall Timbers Res. Stn.

VASILE, R. S., AND V. J. BYRE. 1989. The North American bird collection of the Chicago Academy of Sciences; views of the past, perspectives on the future. Am. Birds 43:

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VENABLES, A., AND M. W. COLLOPY. 1989. Seasonal foraging and habitat requirements of Red-headed Woodpeckers in north-central Florida. Florida Game Fresh Water Fish Comm., Nongame Wildl. Final Rep., 49 pp.—As studied at Ordway Pres., Putnam Co. and in Alachua Co.

VINCE, S. W., S. R. HUMPHREY, AND R. W. SIMONS. 1989. The ecology of hydric hammocks: a community profile. U.S. Fish Wildl. Serv. Biol. Rep. 85(7.26), 81 pp.—Includes analysis of data collected in the mid-1970s on bird populations and community characteristics for the route of the proposed, (and now defunct) cross-Florida Barge Canal.

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WOOD, P. B., T. C. EDWARDS, AND M. C. COLLOPY. 1989. Characteristics of Bald Eagles nesting habitat in Florida. J. Wildl. Manage. 53: 441-449.—In 4 major areas: Alachua and Marion co.; Osceola and Polk co.; Charlotte, Lee, and Sarasota co.; and Ocala National Forest.

ZAIAS, J., AND R. BREITWISCH. 1989. Intra-pair cooperation, fledgling care, and renesting by Northern Mockingbirds (*Mimus polyglottos*). Ethology 80: 94-110.—As studied on the Univ. Miami campus, Dade Co.

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USE OF GOPHER TORTOISE BURROWS BY FLORIDA MICE (*PODOMYS FLORIDANUS*) IN PUTNAM COUNTY, FLORIDA

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Abstract.—In the sandhills of Florida, the Florida mouse (*Podomys floridanus*) lives in burrows of the gopher tortoise (*Gopherus polyphemus*). We excavated five tortoise burrows utilized by *Podomys* in sandhills in Putnam County. The mice inhabited the upper 2 m of the burrows. Small vertical tunnels ("chimneys") provided a secondary entrance to the burrow system and allowed occupation of burrows after the main entrances collapsed. Mice also used pockets and narrow tunnels attached to the side of the main burrow. We consider the extensive association of the mouse with these burrows an adaptation that allowed the mice to live in the hostile environment of the sandhills.

Blair and Kilby (1936) first noted an association between Florida mice (*Podomys floridanus*) and burrows of the gopher tortoise (*Gopherus polyphemus*). They recorded eight mice in five tortoise burrows in an old field near Gainesville, Florida, and saw one mouse enter a small side hole about 2 m from the burrow's entrance. Johnson and Layne (1961) and Milstrey (1987) also noted that *Podomys* inhabited tortoise burrows. In preliminary studies in Putnam County, Eisenberg (1983) reported higher trapping success for *Podomys* at the mouths of burrows (33%) than on transects (0.4%). We also observed in Putnam County that, when released, mice usually ran down tortoise burrows; they rarely climbed trees or sought other refuges, such as fallen logs or the base of trees. For example, Jones (unpubl. data) tallied escape responses for 18 *Podomys* trapped on a grid in 1987-88. Of the 35 responses where the destinations of the mice were observed, 25 (71%) entered tortoise burrows through the main entrance or through chimneys. Presumably, the

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use of tortoise burrows is of adaptive significance. Hallinan (1923) and Hansen (1964) described the shape and dimensions of *Gopherus* burrows, but did not discuss structures used by rodents. The only description of subterranean structures used by *Podomys* was that by Layne (in press), who described nests, nest chambers, and small tunnels found in two tortoise burrows in Alachua County.

In 1986, Franz and C. K. Dodd, Jr. excavated an inactive tortoise burrow and observed *Podomys* in a U-shaped tunnel connected to the main burrow (see Fig. 1A). They also noted a narrow vertical tunnel (which we called a chimney) opening to the surface more than a meter past the burrow entrance. As reported in this paper, we excavated and mapped four additional burrows, in order to describe the parts of tortoise burrows that are modified and utilized by Florida mice.

Study Area and Methods

We examined tortoise burrows on the Katharine Ordway Preserve-Swisher Memorial Sanctuary, Putnam County, Florida. About one-third of this 37 km^2 preserve consists of high pine sandhills dominated by longleaf pine and turkey oak. The climate, flora, and fauna of sandhills on the preserve were described by Eisenberg (1983), Franz (1986), Gates and Tanner (1988), and Dodd and Charest (1988). At Ordway, *Podomys* has been trapped at several locations, all on sandhills or on the margins of sandhills in old pastures or xeric oak forests.

Using criteria established by Auffenberg and Franz (1982), we selected two active burrows (i.e., where soil was disturbed by tortoise), one inactive (where the entrance was open but the soil undisturbed), and one old burrow (where the main entrance had collapsed), all of which appeared to have chimneys. Tortoise burrows were excavated by removing the upper layers of soil with shovels. We constantly watched for chambers and tunnels connecting to the tortoise burrow. During excavation we mapped the tortoise and mouse burrows using 50-meter cloth tape measures, compasses, and plumb lines. Data recorded included: compass bearings of tortoise burrows and adjacent structures constructed by mice; width, depth, and length of the burrows and other structures; presence of crickets and other animals; and presence of leaf litter, acorn hulls, or other evidence of *Podomys floridanus*.

Results

The first excavated burrow system consisted of a main tunnel, a U-shaped passageway, and a chimney that opened to the surface. One *Podomys* was visible in the passageway and chimney during excavation. All four additional burrows showed evidence of recent use by mice, as indicated by the presence of tracks, acorn hulls, and the animals themselves. Dimensions of these burrows and associated structures are summarized in Table 1. A curving chimney was found in each of the additional tortoise burrows that we excavated (Figs. 1-2). Each chimney had a surface diameter of 3 cm, and two were partially plugged with sand (Figs. 1D and 2). The old, closed burrow had the most extensive mouse-tunnel system of the five burrows examined (Fig. 2). In the two deepest

Table 1. Dimensions (meters) of burrows number 2 (active), 3 (inactive), 4 (old), and 5 (active), and chimneys. Two bearings indicate a curve in the main burrow.

	Main burrow			Chimney			
No.	Diameter at entrance	Bearing (degrees)	Total length	Distance to entrance	Diameter at entrance	Length	Entrance to burrow
2	.27	303 (270)	6.1	2.44	.03	.85	1.45
3	.21	71	—	1.56	.03	—	.45
4	.11	141 (99)	5.97	1.52	.03	1.00	.63
5	.29	261	3.72	1.35	.03	.40	.80
Means	.22		5.26	1.72	.03	.75	.83

tortoise burrows excavated (Fig. 1B and 1D), no mouse sign occurred below a depth of 2 m.

Besides the chimney, there were several other structures that probably were utilized by mice. These included U-shaped tunnels, short blind tunnels, and small pockets or chambers that opened onto the side or ceiling of the tortoise burrow. Some of the pockets possibly were constructed by crickets (*Ceuthophilus* sp.). We occasionally saw crickets inside these structures, and camel crickets (*Ceuthophilus latibuli*) are known to construct small tunnels (Gentry and Smith 1968). In the old tortoise burrow, where the main entrance was blocked, the mice not only maintained the chimney (and possibly the pockets), but also constructed an elaborate system of interconnecting tunnels; in so doing they modified parts of the original tortoise burrow.

Although we discovered no mouse nests, we found grass in the chimney of one active tortoise burrow (Fig. 1B). The closed burrow (Fig. 2) had oak leaves (mostly *Quercus geminata* and *Q. hemisphaerica*) and wiregrass lining the floor and walls at the distal end of the modified tortoise burrow. We captured two subadult mice at this burrow, and an adult escaped during the excavation. In addition to *Ceuthophilus* and *Podomys*, we encountered wolf spiders (*Geolycosa* and *Lycosa*), unidentified opiliones, gopher crickets, and *Gopherus* during our excavations.

DISCUSSION

In high pine sandhills, the Florida mouse is associated closely with burrows of the gopher tortoise. At Ordway, many individuals typically show fidelity to one or two tortoise burrows (Jones unpubl. data). Because we have monitored some tortoise burrows at Ordway since 1983, we have been able to recognize small holes used by mice as remnants of

preexisting tortoise burrows, even when the main entrance to the old burrow was no longer evident.

Perhaps the most obvious function of burrow use by Florida mice is to provide a refuge, since sandhills are among the most xeric habitats in northern Florida. Burrow temperatures remain fairly constant through the year relative to air temperatures, with temperature decreasing at a rate of 0.9°C/m (Douglass and Layne 1978; Speake 1981; Franz unpubl. data). Burrows also provide a refuge from fire. Sandhill vegetation is fire-adapted; conversion to a xeric hardwoods/mixed pine association begins after about 50 years without fire (Myers 1985).

King et al. (1964), Wolfe (1970), and Layne (1969, in press) described the nests built by *P. floridanus*. *Podomys* used less nesting material and built smaller, flatter nests compared to *Peromyscus gossypinus* and *P. polionotus*. Two *Podomys* burrows excavated by Layne (in press) in sandhills in Alachua County were lined with vegetation in a manner similar to the burrow we found lined with oak and wiregrass leaves (Fig.

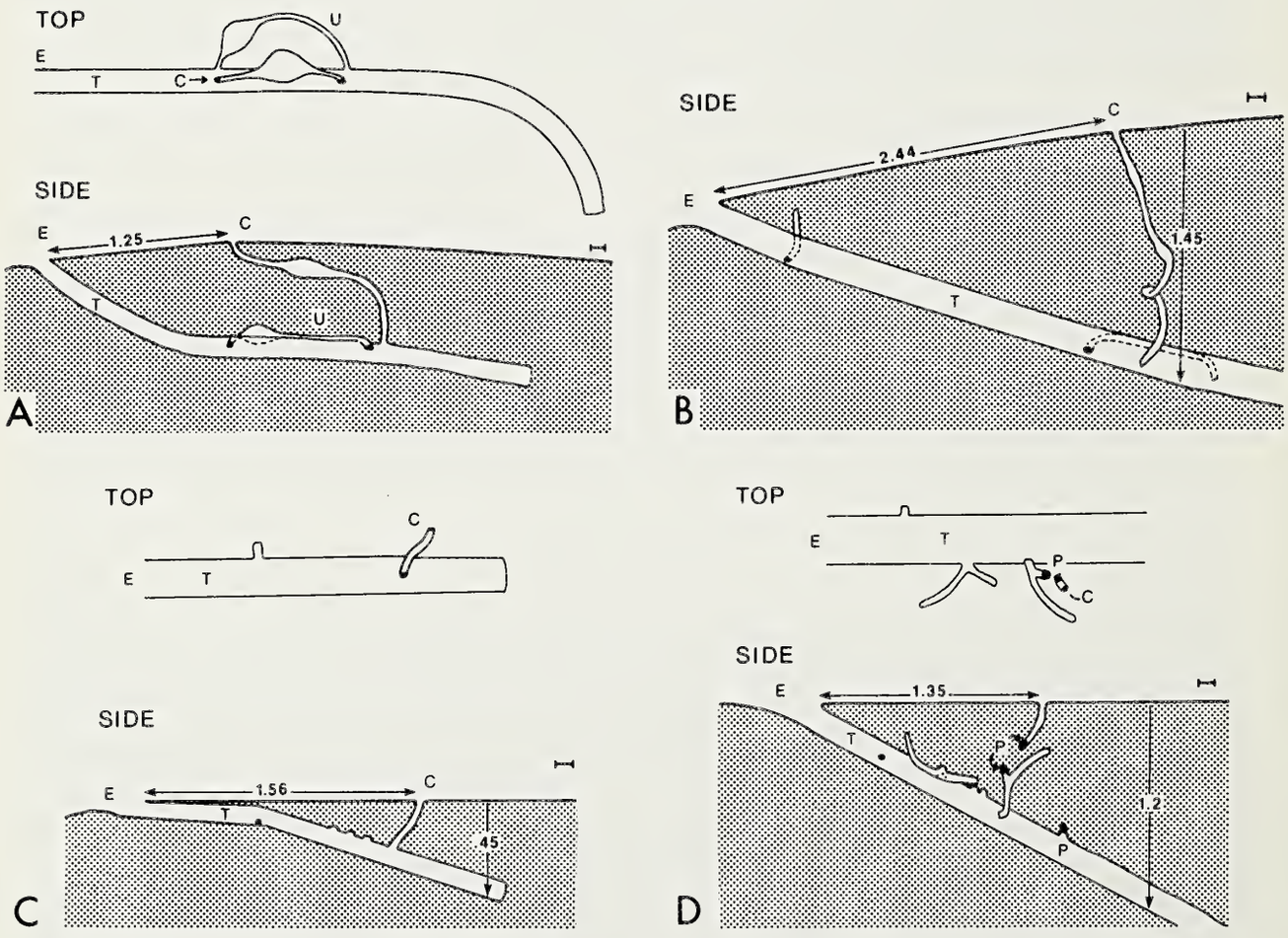

Figure 1. Inactive (A, C) and active (B, D) tortoise burrows excavated on the Ordway Preserve. Measurements are shown in meters; the bar represents 10 cm. Abbreviations are as follows: C = chimney, E = entrance to tortoise burrow, P = plug, T = tortoise burrow, and U = U-shaped tube.

2). Layne (1969) suggested that the relatively poor nest-building abilities of *Podomys* indicated a long evolution of burrow use under warm, xeric climatic conditions.

We found no food caches or fecal deposits, although *Podomys* cached acorns and other food under laboratory conditions (Jones unpubl. data). Hulls of opened acorns were common in the tortoise burrow, in mouse tunnels and pockets, and occasionally on the apron at the burrow entrance. Nowhere were food remains as numerous as those observed in *P. polionotus* burrows by Gentry and Smith (1968).

The precise function of the curved chimneys is uncertain. The absence of a mound at the chimney entrance implies a lack of ventilation by convection, as reported for hillocked holes made by other fossorial mammals (Vogel et al. 1973). On the Ordway several species of snakes that are potential predators of Florida mice utilize tortoise burrows (Franz 1986; Timmerman 1989), and we believe that chimneys and the U-shaped

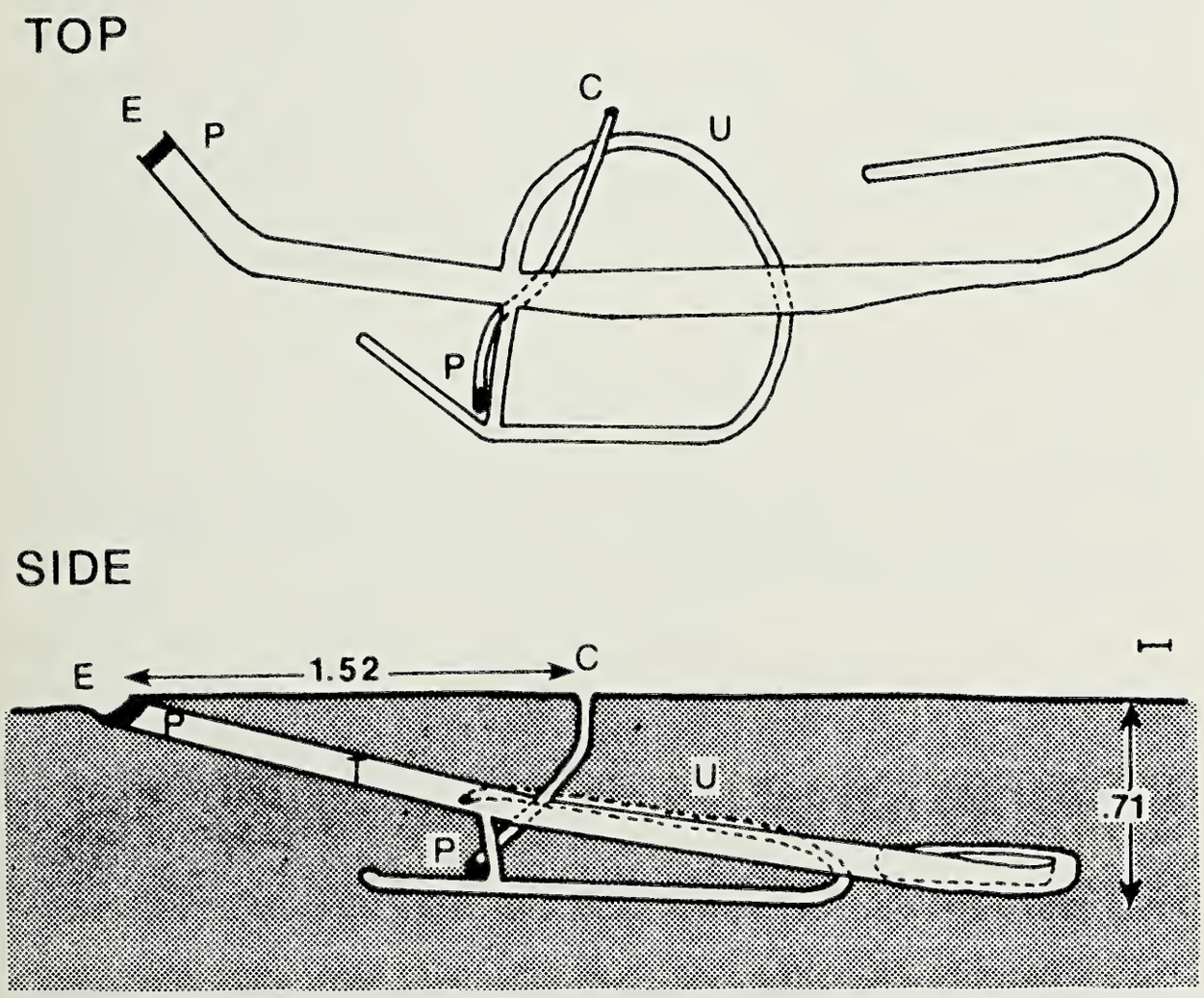

Figure 2. The old tortoise burrow excavated at Ordway. Abbreviations as for Figure 1.

tunnels might serve as escape tunnels similar to those described for other small mammals (Sumner and Karol 1929; Hayne 1936; Brown and Hickman 1973). *Podomys* are susceptible to cold weather (Layne 1969; pers. obs.), and perhaps the tunnels allow mice to move within a preferred temperature gradient, so they can stay at a higher temperature than used by *Gopherus* at the bottom of the burrow while still escaping ambient temperature extremes.

At other study sites, Layne (in press) observed *Podomys* using burrows constructed by other mammals (*P. polionotus*, *Sigmodon hispidus*, *Geomys pinetis*, and *Dasypus novemcinctus*). In the ecotone between mesic hammock and longleaf pine flatwoods, Starner (1956) trapped a Florida mouse in a small burrow that she thought might have been dug by the mouse and Lee (1968) reported that *Podomys* dug its own burrows in scrub ecotone. However, on the Ordway Preserve we had no evidence that *Podomys* dug its own burrows or inhabited logs or other shelters.

Jones (unpubl. data) trapped for more than 17,000 trapnights at tortoise burrows on three sandhills on Ordway and captured only one *P. gossypinus*. Clearly, rodents other than *Podomys* were only occasional visitors to tortoise burrows in these sandhills, although in other parts of Florida tortoise burrows in sandhills are used by *P. gossypinus*. The extensive use of gopher tortoise burrows by *P. floridanus* might be unique among rodents. Layne (1969) suggested that its restriction to nesting in burrows and poor nesting ability contributed to *Podomys*' relatively limited habitat use and geographic range. At the same time, we believe that the ability of this species to take advantage of gopher tortoise burrows contributes to its success in the xeric sandhill environment.

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NOTES

Florida Field Naturalist 18(3): 52-55, 1990.

Use of Power Poles for Nesting by Red-tailed Hawks in South-Central Florida

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Most raptors that use power poles or transmission towers for nesting are species that inhabit open plains, prairies, or savannahs where the absence of large trees or cliffs renders otherwise suitable habitat unsuitable for breeding (Olendorff et al. 1981). The one notable exception is the Osprey (*Pandion haliaetus*), which uses man-made structures as nest substrates more than any other raptor (Olendorff et al. 1980). Use of power line structures by other raptors is often a local phenomenon (Stocek 1972, Gilmer and Wiehe 1977, Fitzner 1980, Olendorff et al. 1981). This phenomenon frequently has been documented for the Ferruginous Hawk (*Buteo regalis*) in the western United States (e.g., Olendorff and Stoddart 1974, Gilmer and Wiehe 1977, Olendorff et al. 1980). Several other raptor species have been reported to nest on power line structures in western states, including Golden Eagle (*Aquila chrysaetos*), Red-tailed Hawk (*Buteo jamaicensis*), Swainson's Hawk (*B. swainsoni*), Harris' Hawk (*Parabuteo unicinctus*), and Great Horned Owl (*Bubo virginianus*) (Baldridge 1977, Nelson and Nelson 1976, Ellis et al. 1978, Fitzner 1980, Meentz and Delesantro 1979, Lee 1980).

In the eastern United States, however, power pole nesting by raptors other than American Kestrels (*Falco sparverius*) and Ospreys apparently is rare. Red-tailed Hawks in this region almost exclusively use live, deciduous trees for nesting (e.g., Hagar 1957; Titus and Mosher 1981; Speiser and Bosakowski 1988: Toland, in review). I could find no reports of nesting on power poles or transmission towers by Eastern Red-tailed Hawks (*B. j. borealis*) or Florida Red-tailed Hawks (*B. j. umbrinus*). Here, I report on two successful Red-tailed Hawk nests on power poles in Polk County, Florida.

On 25 May 1989, I discovered two Red-tailed Hawk nests built on temporary 230 kV powerline poles traversing I.M.C. Fertilizer Inc.'s 930 ha Noralyn/Phosphoria phosphate mineland, 3.0 km southwest of Bartow, Florida. This area is an active phosphate strip mine interspersed with mined lands reclaimed to cattail (*Typhus sp.*) dominated marshes, disturbed ruderal shrubland characterized by willow (*Salix sp.*), dog fennel (*Eupatorium capillifolium*), wax myrtle (*Myrica cerifera*), salt bush (*Baccharis halimifolia*), and broomsedge (*Andropogon virginiana*), and xeric scrub represented by scrub live oak (*Quercus geminata*) and prickly-pear cactus (*Opuntia humifusa*). A rapidly disappearing remnant of unmined xeric oak scrub and longleaf pine/turkey oak sandhill native plant communities are patchily distributed in the area. With the exception of a ca. 8.0 ha tract of slash pine (*Pinus elliottii*), only three or four trees over 6.0 m in height persist on site.

The two nests were located about 4.0 km apart, and both were built on cross-arm structures ca. 12.2 m high (Fig. 1). Each nest contained a single 5-week old nestling. Both nestlings fledged successfully on 5 and 8 June, respectively. The mean productivity of 1.0 young fledged per power pole nest was substantially lower than the 1.5 young fledged per natural nest (N = 12) in south Florida (Toland, unpubl. data).

Nesting on transmission line substrates is advantageous in that it facilitates more uniform habitat utilization by attracting raptors into areas where nest site availability is a

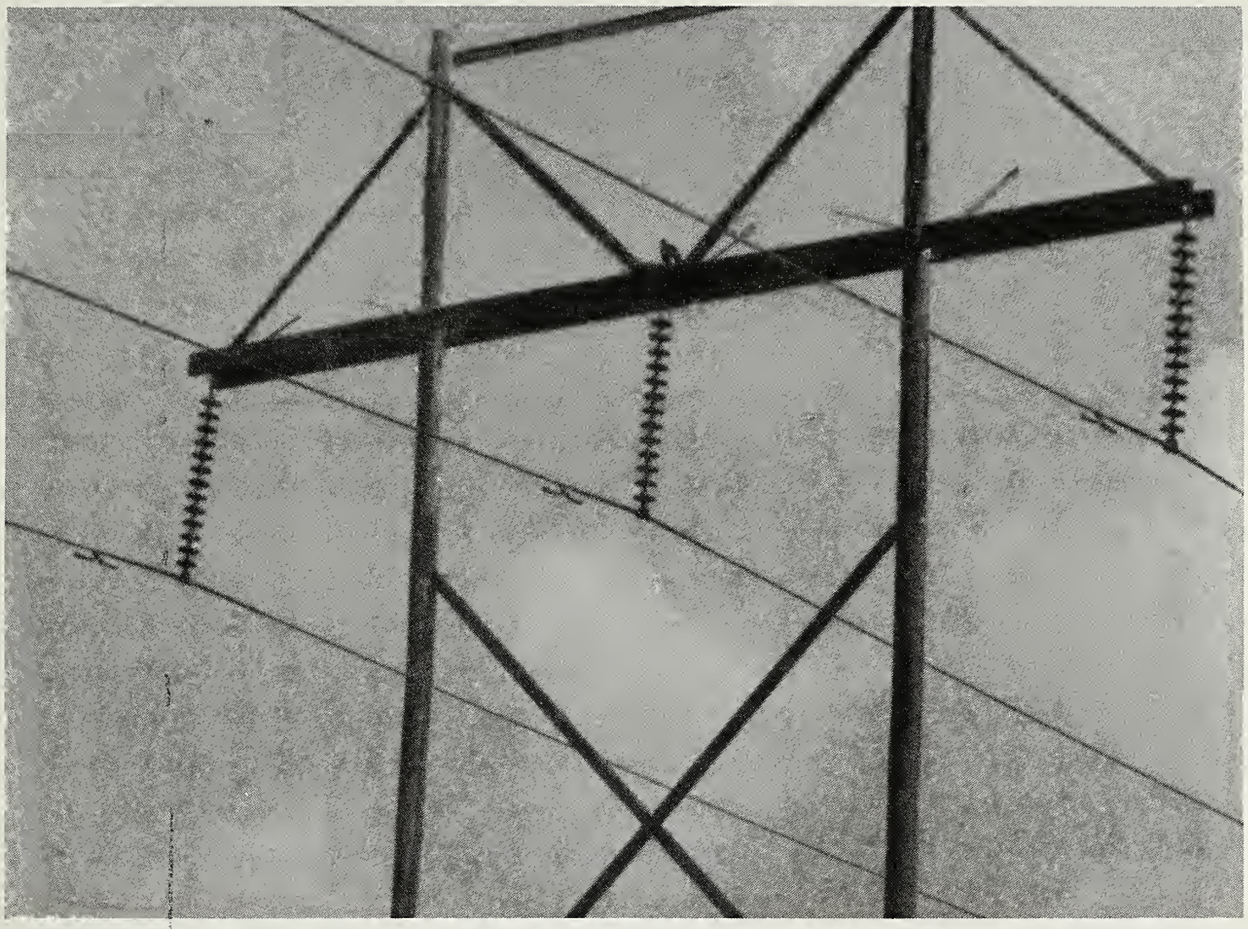

Figure 1. Red-tailed hawk nest built on 230 kV transmission line structure (top) and a single 5-week old nestling (bottom). (Photographs by Brian Toland)

limiting factor (Olendorff et al. 1981). By exploiting power poles for nest sites, some raptors may actually extend their breeding range (Nelson and Nelson 1976). It may be more likely, however, that by affording a species additional nest site choices, power line structures lead to locally higher raptor densities (Meentz and Delesantro 1979, Olendorff et al. 1981). These artifical nest sites also may be an asset to raptor nesting success, by making access to the nest by mammalian predators more difficult than to nests in live trees.

There are, however, some distinct disadvantages to nesting on power poles. These nests appear more vulnerable to damaging windstorms that can blow nests or young off of the narrow platforms (Gilmer and Wiehe 1977). Nestlings can become heat stressed due to limited availability of shade provided by tower beams and cross braces (Olendorff et al. 1981). The relatively narrow platform provided by the cross arm structure effectively limits the space available for the nest, causing crowding of nestling raptors as they grow older and increase in size and mobility (Gilmer and Wiehe 1977). Both power pole nests in south-central Florida were substantially smaller than the stick structures Red-tailed Hawks build in live trees (Toland, pers. observ.).

Still undocumented are the effects of electric field strength on nesting raptors as well as the significance of electrocution of raptors exploiting power line structures for hunting and nesting in Florida. Whether or not a new power line enhances or detracts from raptor habitat probably depends on physiographic characteristics that influence habitat diversity (Pearson 1979). Whereas power lines in topographically diverse habitats may be relatively deleterious to raptors, they may provide the diversity necessary for nesting and more effective foraging by predatory birds inhabiting large expanses of homogeneous habitat such as that occurring at south-central Florida's Noralyn/Phosphoria mineland.

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Courtship Feeding Behavior in the Mangrove Cuckoo *(Coccyzus minor)*

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Near 11:00 of 4 May 1989 on the West Lake Mangrove Trail in Everglades National Park, Dade County, Florida, I observed courtship feeding behavior between two Mangrove Cuckoos (*Coccyzus minor*). The birds were in red mangroves (*Rhizophora mangle*) about 6 m away. On my left I heard and saw a male Mangrove Cuckoo emit a single, guttural note four or five times, and on my right the female answered six or seven times with a low guttural different note that verbalized as "squirt". Then the male, with a spider in his bill, flew to the perched female. He landed on her back and fed her. While the male offered the spider from above, the female twisted her neck and tilted her head so that her bill pointed skyward and accepted the spider with neither begging involved nor copulation occurring.

In describing the courtship feeding behavior of the Yellow-billed Cuckoo (*C. americanus*), J. H. Bowles (*in* Bent 1940) wrote, ". . . I saw the male suddenly fly past with a large green worm in his bill. He flew directly to the female, who was perched in a tree a few yards distant, and for a moment or two they sat motionless a few inches part looking at each other. The male then hovered lightly over his mate and, settling gently upon her shoulders, gracefully bent over and placed the worm in her bill." Potter (1980) also describes feeding during copulation by Yellow-billed Cuckoos.

Spencer (1941) reported that although the male Black-billed Cuckoo (*C. enthropthalmus*) had food in his bill during several attempts to copulate, no courtship feeding was observed despite 94 hours of observation. Potter (1980) wrote that ". . . a search of the literature has revealed no other description of insect passing . . ." for both Yellow-billed and Black-billed cuckoos. However, Ehrlich (1988) mentioned courtship feeding for the Black-billed Cuckoo, but provided no details. Since then, Nero (1988) watched an exchange of food during copulation of Black-billed Cuckoos.

To my knowledge, courtship feeding has not previously been described for the Mangrove Cockoo, for which details of courtship behavior are known (Ehrlich 1988). The behavior appears, however, to be quite similar to that of Yellow-billed and Black-billed cuckoos.

I thank Fred Lohrer, Bruce Neville, Rich Paul, and Paul Sykes for help and encouragement.

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St. Augustine Christmas Bird Count 1988

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Due to circumstances beyond the control of most of the participants, the St. Augustine, Florida, Christmas Bird Count for 1988 was not submitted on time and failed to be published in *American Birds*. One of the values of the annual Christmas bird counts is they can provide a sample of winter bird populations in a given area on a long-term basis. Therefore, a hiatus in the data for an entire year lessens the value of the entire mass of data by an appreciable amount. For this reason it is desirable to make these data available to investigators. The results of the 1988 St. Augustine count were as follows:

Date: 17 December, 1988; 05:00-19:45 hrs. Temperature 30 to 52 F. (–1 to 11.1 C.), wind N-NW, 10-23 mph (16-37 kph). Twenty-two observers in 8 parties: owling 5.5 miles (8.8 km), non-owling 31.3 miles (50 km). Total party hours: 76.5; total party miles 370.5 (592.8 km); 18 hours and 315.5 miles by car (507.2 km); 50 hours and 19 miles (30.4 km) on foot; 34 miles (54.4 km) and 8.5 hours by boat.

Red-throated Loon 1; Common Loon 8; Pied-billed Grebe 24; Northern Gannet 19; American White Pelican 26; Brown Pelican 596; Double-crested Cormorant 391; Great Blue Heron 125; Great Egret 137; Snowy Egret 104; Little Blue Heron 70; Tricolored Heron 53; Cattle Egret 2; Green-backed Heron 8; Black-crowned Night-Heron 152; White Ibis 245; Wood Stork 37; Wood Duck 11; Green-winged Teal 7; Am. Black Duck 2; Mallard 50; Ring-necked Duck 3; Lesser Scaup 10; Hooded Merganser 72; **Common Merganser** 1 (careful study, Loftin party); Red-breasted Merganser 128; Ruddy Duck 1; duck sp. 7; Black Vulture 17; Turkey Vulture 129; Osprey 19; Bald Eagle 3 (2 adult, 1 immature); Northern Harrier 24; Sharp-shinned Hawk 3; Cooper's Hawk 2; accipiter sp. 1; Red-shouldered Hawk 6; Red-tailed Hawk 32; American Kestrel 29: Merlin 1; Northern Bobwhite 1; Clapper Rail 48; Sora 4; Common Moorhen 33; American Coot 8; Black-bellied Plover 99; Wilson's Plover

5; Semipalmated Plover 141; Piping Plover 10; Killdeer 48; American Oystercatcher 18; Greater Yellowlegs 1; Lesser Yellowlegs 41; Willet 253; Spotted Sandpiper 5; Whimbrel 22; Ruddy Turnstone 219; Red Knot 9; Sanderling 103; W. Sandpiper 83; Least Sandpiper 6; Purple Sandpiper 1; Dunlin 535; peep sp. 3; Short-billed Dowitcher 692; Common Snipe 4; Woodcock 1; Laughing Gull 2187; Bonaparte's Gull 35; Ring-billed Gull 2598; Herring Gull 1043; Lesser Black-backed Gull 1; Great Black-backed Gull 23; gull sp. 350; Caspian Tern 46; Royal Tern 589; Sandwich Tern 13; Forster's Tern 972; Black Skimmer 1030; Rock Dove 252; Mourning Dove 448; Common Ground-Dove 18; Black-hooded Parakeet 2; E. Screech-Owl 9; Great Horned Owl 2; Barred Owl 1; Belted Kingfisher 46; Red-bellied Woodpecker 34; Yellow-bellied Sapsucker 5; Northern Flicker 10; Pileated Woodpecker 3; Eastern Phoebe 18; Tree Swallow 55; Blue Jay 72; American Crow 22; Fish Crow 14; Carolina Chickadee 3; Tufted Titmouse 25; Carolina Wren 25; House Wren 7; Sedge Wren 3; Marsh Wren 2; Golden-crowned Kinglet 1; Ruby-crowned Kinglet 73; Blue-gray Gnatcatcher 6; E. Bluebird 11; Hermit Thrush 3; Am. Robin 26; Gray Catbird 10; Northern Mockingbird 72; Brown Thrasher 1; Cedar Waxwing 1; Loggerhead Shrike 12; European Starling 323; White-eyed Vireo 5; Solitary Vireo 5; Orange-crowned Warbler 4; Yellow-rumped Warbler 1421; Yellow-throated Warbler 2; Pine Warbler 7; Palm Warbler 21 Black-and-white Warbler 2; Common Yellowthroat 4; Northern Cardinal 73; Rufous-sided Towhee 21; Bachman's Sparrow 1; Chipping Sparrow 58; Vesper Sparrow 2; Savannah Sparrow 32; Seaside Sparrow 4; Song Sparrow 5; Swamp Sparrow 3; sparrow sp. 1; Dark-eyed Junco 1; Red-winged Blackbird 1076; E. Meadowlark 2; Rusty Blackbird 150; Boat-tailed Grackle 243; Common Grackle 289; Brown-headed Cowbird 25; American Goldfinch 7; House Sparrow 6.

A total of 17,901 birds of 137 species were observed during the count. The following individuals participated in the 1988 Christmas bird count: Pete and Jessica Ahmed, Paul Beiderwell, Mary Davidson, Ruth Erke, Greg Gilbert, Rhoda Josephson, Robert Loftin, Cliff Petit, Peggy Powell, Diane Reed, Bob Richter, Bud and Skeeter Rottman, Loren Stein, Irene Stone, Esther and Robert Vermouth, Diane and Robert Wears, Terry West, Jim Wheat.

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Predation of Domestic Fowl Eggs by Red-bellied Woodpeckers

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At my farm in Beulah Community, Kingstree, Williamsburg County, South Carolina, during 1957 and 1964, I found Red-bellied Woodpeckers (*Melanerpes carolinus*) eating the contents of the eggs of Domestic Fowl (*Gallus gallus*). During the first period (June-August 1957) I found 72 eggs punctured by two female Red-bellied Woodpeckers. The chickens were nesting in an array of 16 open-sided wooden nest boxes placed on the side of a small shed (average height of the boxes = 1.5 m). On numerous occasions, the woodpeckers were seen flying directly to unattended nests from nearby trees. They then pecked holes (5-7 mm in diameter) in the sides of the eggs, and consumed the eggs' contents while perched

at the nests. The chicken eggs were the brown type, and measured 45-63 mm in length. Three of the 72 eggs had more than one hole (two in each of the three eggs). I collected four specimens of destroyed eggs during the period 18 July-4 August 1957 (ChM no. 1984.64).

Brackbill (1969) reported Red-bellied Woodpeckers taking the eggs of House Sparrows (*Passer domesticus*). This appears to be the only other report of their taking birds' eggs. However, Phillips *et al.* (1964) have reported the closely related Gila Woodpecker (*M. uropygialis*) eating chicken eggs.

I thank W. Post for useful suggestions on the manuscript.

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REVIEWS

Florida Field Naturalist 18(3): 58-59, 1990.

The Birder's Handbook: A Field Guide to the Natural History of North American Birds.—Paul R. Ehrlich, David S. Dobkin, and Darryl Wheye. 1988. Simon and Schuster, New York, NY. ISBN 0-671-65989-8. Paperback, 815 pages. $15.95.—For those interested in observing and learning more about birds in the field, this is the most valuable book to appear since Roger Tory Peterson's field guide. Unlike other field guides, it answers all those questions you've always had about birds once you've identified them. In essence, "The Birder's Handbook" compresses an entire ornithological library into a volume that

can be thrown in a backpack, carried in your car, or leisurely perused at home. And it is the least expensive bird book, per page, I have seen.

The format is modeled on a standard identification guide, and is designed as a companion volume for one. On the left-hand pages, accounts are given of all the bird species that breed in North America; opposite them, instead of pictures, are essays that pertain to the species on the facing page.

The accounts, two to a page, briefly describe the biology of each species: nesting habits, incubation time, care of the young, mating system, foraging habits, conservation status, etc. Much of this is presented in an ingenious line of symbols and numbers which is quickly and easily understandable. Suppose, for instance, you have just seen an Eastern Phoebe carrying nesting material. A glance at the species treatment will tell you, among many other things, that the bird was a female, that its nest is likely to be in or on a human-built structure, that 4-5 white eggs will probably be laid in it, that they will hatch in 16 days, and that the young will fledge a couple of weeks later. The treatment also refers you to brief essays (in this case Vocal Development, Brood Parasitism) that would make interesting reading after seeing an Eastern Phoebe, and to a comprehensive bibliography.

The treatments are jam-packed with interesting information. As a combined scientist-birder, I was pleased to see question marks used to indicate where knowledge was incomplete. "The Birder's Handbook" serves not just as a guide to what is known about the biology of North American birds, but also to what is not known, thereby pointing out where birders could make important contributions to science. The short section in the introduction on "Dealing with Uncertainty" should be a model for the authors of other field guides.

The several hundred essays cover the entire panoply of avian evolution, ecology, behavior, taxonomy, biogeography, and conservation, as well as presenting short biographies of important ornithologists and the origin of bird names. There is even one on the role that birds have played in the arts. Not only are these interestingly written and up to date, but they manage to present a vast amount of material in digestible, understandable chunks. Complex subjects such as why birds would evolve altruistic behavior (e.g., adults helping other adults to breed rather than reproducing themselves), what goes on inside eggs, how natural selection operates, and how birds fly, are presented clearly and concisely.

The essays will clear up many mysteries for curious birders, such as why gulls and shorebirds often stand on one leg, why hummingirds spend so much time perched, and how owls manage to find prey in the dark. Birders can learn current theories about more persistent mysteries, such as why female raptors tend to be larger than males, why many birds form flocks, why Bachman's Warbler has disappeared, how migrating birds navigate, why redwings vary the exposure of their "epaulettes," why songbirds are becoming less abundant in the East, and why some bird species have forsaken monogamy for various other sexual arrangements.

Finally, concern for the environment is woven throughout the book. It is both historical (there are treatments and essays on all North American birds that have gone extinct in historic times), and current (with essays on threats to birds and on how to help conserve them). Birds are, of course, important indicators of global environment problems from climate change to the destruction of tropical rain forests and forests in North America. The millions of birders in the United States represent a largely untapped resource for helping to keep track of what is happening to the natural environment, and trying to keep those happenings from destroying Earth's avifauna and us along with it. Birders also are in a position to add a great deal to the scientific understanding of avian biology. Until now, however, there has been little in the way of literature that would help the average birder make the transition from spotting and identifying birds to understanding them. Now this fascinating and inexpensive volume will make that step easy for all who are interested.—**John Harte**, Energy and Resources Group, Building T-4, Room 100, University of California, Berkeley, California 94720.

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FIELD OBSERVATIONS

Prepared by the Field Observations Committee

With this issue of the *Florida Field Naturalist*, we initiate a new feature providing noteworthy sightings of Florida birds. The Field Observations section will present sightings of rare and accidental species, breeding records of note, and information on unusual numbers or geographical occurrences of more common species. We hope that Field Observations will be of great interest to the readers of this journal, as well as provide an outlet for sightings that might not qualify as formal notes.

The idea of a "field notes" section has been discussed by FOS members for years. There has been some reluctance to initiate the feature since it would essentially duplicate information presented in American Birds, but we hope that the overlap in readerships is sufficiently small, and the information sufficiently interesting, to warrant such duplication. We also note that many other state journals provide such a service for their readers.

We have chosen a quarterly reporting format for this new section. It seemed unrealistic to us to divide Florida's variable phenology into breeding, migration, or other seasons. Wading birds initiate breeding in south Florida as unusual wintering sparrows are seen in north Florida. The report periods thus have been divided into winter (Dec - Feb), spring (Mar - May), summer (Jun - Aug), and fall (Sep - Nov). This format also coincides with the quarterly distribution of the *Florida Field Naturalist.*

The sightings reported here are largely unsubstantiated field observations. None of the observations has been reviewed by the FOS Records Committee, and, as such, the observations should be considered tentative pending a more formal review. We encourage observers to submit appropriate records to the Records Committee c/o Jocie Baker (Secretary), 851 N. Surf Rd., #302, Hollywood, FL, 33019.

Several conventions have been adopted to save space. Only the initials of observers are presented with the accounts of individual species. A complete list of observers, with initials, is provided at the end. Common names are used exclusively; persons interested in scientific names should consult A.O.U. (1983. Checklist of the North American Birds, 6th ed. Lawrence, Kansas: Allen Press, Inc.) and revisions as published in *The Auk.* Other uncommon abbreviations used throughout the text are: BBS, breeding bird survey; CBC, Christmas Bird Count; m. obs., many observers; NP, national park; NWR, national wildlife refuge; SP, state park; and SRA, state recreation area. Unless necessary, the counties of named locations are omitted.

Winter Report: December 1989 - February 1990

The winter period was characterized by abnormally low precipitation in south and central Florida and generally mild temperatures throughout the state as a whole. The mild temperatures likely contributed to the diversity of hummingbirds, nighthawks, and warblers recorded. The unusually strong cold front that swept across the State just before Christmas sent freezing temperatures as far south as Dade Co. On the coldest days of the freeze (23-25 Dec), temperatures remained well below freezing throughout the day in north and central Florida. The cold weather appeared to enhance the diversity and number of certain sparrows and finches recorded on many CBC's held around this severe weather period.

Duck numbers were lower throughout the southern portion of the State, a likely result (in part) of the drought conditions. Numbers of ducks in the central and northern portions of the State were generally reported not as low as numbers to the south. Several large

counts of ducks occurred at permanent water bodies located on IMC Fertilizer mines (Polk Co.), which begs a question of whether more ducks winter in these altered lands than in refuges and parks. The drought also created disastrous conditions for colonial waterbirds in southern Florida: few nesting attempts were reported for species that normally begin nesting in winter. Numbers of several wading birds were reported down throughout south Florida.

The Field Observations Committee thanks all contributors to this column. If we have overlooked any unusual observations that you know of, please bring them to our attention by writing to Jim Cox, compiler.

RED-THROATED LOON: 1 on 19 Dec, Merritt Island CBC (m. obs.); 1 also on 13 Jan off Alligator Point, Franklin Co. (JoH).

PACIFIC LOON: 1 on 18 Feb off Gulf Breeze, Santa Rosa Co. (PhT); 8th record for area.

COMMON LOON: seen farther south than usual this winter; 2 at Smathers Beach (Key West) on 17 Dec (JO).

EARED GREBE: 5 at IMC mines (Polk Co.) from 28 Jan - Feb (PeT, DF, m. obs.); also on lakes Ariana and Arietta (ca. Auburndale, Polk Co.; CG, PeT).

SHEARWATER SP: unidentified shearwater seen off Key Biscayne on 22 Dec (OS); a noteworthy sighting given the paucity of information on pelagic avifauna of extreme south Florida.

NORTHERN GANNET: several on Lower Keys CBC on 16 Dec; "hundreds observed" moving southward off Key Biscayne on 22 Dec (OS, m. obs.).

WHITE PELICAN: high count of 7,000 at IMC mines on 6 Jan (PF).

LEAST BITTERN: 1 on Wakulla River (Wakulla Co.) on 5 Jan (SC), unusual winter record.

GREAT BLUE HERON, WHITE MORPH: 1 in Melbourne (Brevard Co.) throughout report period; north of normal range (BBr).

SNOWY EGRET: 941 recorded at IMC mines (BC) on 29 Jan ; probably included refugees from the south Florida drought.

YELLOW-CROWNED NIGHT-HERON: unusually large roost of 75-100 in SW Broward Co. (CP, JB) on 3 Feb.

ROSEATE SPOONBILL: 2 at different phosphate mines in Polk Co., 2 Dec - Feb (CG); inland sightings are unusual.

WOOD STORK: 2 records at St. Marks NWR: 1 on 29 Jan; 8 seen on 23 Feb (RW, CGi, DaS); rare in winter in north Florida.

GREATER FLAMINGO: wintered again in Florida Bay, Everglades NP; high count of 13 on 10 Dec (Florida Trail Assoc. canoe party).

FULVOUS WHISTLING DUCK: 1 observed at St. Marks NWR, 24 Feb-11 Mar (DaS, RW, CGi); also on Lake Placid CBC, 16 Dec; rare winter records for both areas.

TUNDRA SWAN: 1 on L. Seminole (Jackson Co.; DBr) on 14 Dec; 1 on 28 Dec and 4 Feb at Hickory Mounds Impoundment (Taylor Co.; DBr, DaS).

SNOW GOOSE: 75-125 at M-K Ranch (Gulf Co.) on 9 Dec (HLn, TM, JRi, PG); 1 blue morph at Gulf Coast Community College until late Feb (RD); 2 white morphs on Fish Creek CBC on Dec 23 (Taylor Co.; m. obs.); 5 white morphs, 1 blue morph on (Lakeland CBC (Polk Co.) on 16 Dec; 3 blue morphs on Merritt Island CBC (Brevard Co.) on 19 Dec (m. obs.); 1 blue morph west of Gainesville on 17 Feb with 300 sandhill cranes (CH).

BRANT: 1 on Merritt Island CBC (Brevard Co.) on 19 Dec (m. obs.).

CINNAMON TEAL: 1 in early Nov at Myakka River SP (Sarasota Co.); seen at various times during Dec (DG).

NORTHERN SHOVELER: high count of 4,300 at IMC mines on 28 Jan (PF, DF).

GADWALL: more widespread than other ducks in south Florida area (BrN); 1 male at Eco Pond, Everglades NP, late Dec - 3 Feb (m. obs.); 24 at IMC mines (PF, DF), which is higher than usual.

EURASIAN WIGEON: 1 at Snake Bight, Everglades NP, on 28 Dec (sightings book, WC); 1 on Merritt Island NWR from 29 Dec - 3 Feb (DS, ES).

CANVASBACK: 87 at IMC mines on 26 Feb (BC) (high count); 6 on the Fort Lauderdale CBC (Broward Co.) on 17 Dec (WR, ER, GR, JB), high number for south Florida.

RING-NECKED DUCK: 5,000+ at IMC mines (PF) at various times this winter.

HARLEQUIN DUCK: female at St. Marks NWR on 9 Dec (CGi); immature males at Sebastian Inlet SRA from 11-18 Feb (JeG, BrN, WN).

BLACK SCOTER: 15 near Powell Lake (Bay Co.) on 2 Dec (TM); 5 on South Brevard CBC (m. obs.) on 16 Dec; Merritt Island CBC produced 2 birds on 19 Dec (m. obs.); also reported on Cedar Key CBC.

WHITE-WINGED SCOTER: 3 at Honeymoon Island SRA (Pinellas Co.) on 14 Jan (PaT); 2 on Merritt Island CBC (Brevard Co.) on 19 Dec (DS); also on Cedar Key CBC.

COMMON GOLDENEYE: rare inland; 1 near Archbold Biological Station (Highlands Co.; JFp) on 29 Dec.

HOODED MERGANSER: 5,700 (!) at IMC mines (PF) on 2 Dec.

AMERICAN SWALLOW-TAILED KITE: 1 in early Dec (JD) near Naples (Collier Co.); rare winter record.

SNAIL KITE: more widespread than usual, probably as a result of drought conditions. Extra-range sightings include: (1) male at Nine Mile Pond, Everglades NP on 28 Dec [park sightings book]; (2) 8 in water conservation areas, Broward Co. on 10 Jan (ER, JB); (3) male in farmlands outside Everglades NP (JeG) on 20 Jan; (4) up to 3 males and a female near Lehigh Acres (Lee Co.) from 25-28 Feb (m. obs.); (5) 1 on Lake Wales CBC (Polk Co.; second record for count) on 30 Dec; and (6) 1 at Archbold Biological Station (Highlands Co.; FL, JFp, GW, JaH) on 3 Jan. Eighty recorded on Dec survey of Lake Kissimmee (JRo).

BROAD-WINGED HAWK: 1 seen over Street-Audubon Nature Center (Polk Co.) on 4 Feb (PF, LCo; 3rd co. record); 1 on Brooksville CBC (SF).

SHORT-TAILED HAWK: immature seen on Dade Co. CBC (DO) on 16 Dec, in an urban area; unusual record given the bird's preference for forested areas.

FERRUGINOUS HAWK: 1 at IMC mines (PF, DF) on 28 Jan.

MERLIN: 1 on Tallahassee CBC (JCa) on 1 Jan; rare in winter, much less inland.

PEREGRINE FALCON: pair in downtown Jacksonville from early Oct-Feb; they caught pigeons and delighted people in downtown office buildings (m. obs.).

LIMPKIN: 1 unusual coastal sighting at Merritt Island NWR (Brevard Co.) on 21 Dec-27 Jan (KB, LiC).

SEMIPALMATED PLOVER: uncommon inland; 13 at IMC mines (PF, m. obs.) on 2 Dec.

KILLDEER: fledged young in early Dec in Lakeland (Polk Co.; BC); high count of 115 at Key West (JO) on 24 Dec; unusual numbers noted elsewhere on this day, which came just after sleet and snow fell throughout north Florida.

BLACK-NECKED STILT: 1 on Lakeland CBC (Polk Co.; m. obs.); high count of 12 at IMC mines (PF, DF) on 28 Jan.

LONG-BILLED CURLEW: 1 on Tyndall Air Force Base (Bay Co.) on 1 Dec (PH).

WESTERN SANDPIPER: 2 rare inland sightings: 1 on Lakeland CBC (Polk Co.); 15 at IMC mines on 6 Jan (PF).

WHITE-RUMPED SANDPIPER: first Polk Co. winter record on 19 Dec (BC, LCo, JFs, BBr).

PECTORAL SANDPIPER: 1 on East Pasco CBC on 27 Dec (BP, DG, WB); second winter record for Pasco Co.

PURPLE SANDPIPER: 1 on Ponce de Leon Inlet CBC on 17 Dec (m. obs.); remained in area after count.

LONG-BILLED DOWITCHER: 1-3 at Merritt Island NWR (RB, DS) from 12 Dec - 10 Jan (unusual at Merritt Island); 7 on Tallahassee CBC (HS) on 1 Jan; high count of 617 at IMC mines (PF) on 6 Jan.

AMERICAN WOODCOCK: noted in greater abundance in several places; 1 on Anhinga Trail, Everglades NP (AH) on 11 Dec; 1 displayed at "Hole-in-the-Donut," Everglades NP (PS), Jan - Feb (m. obs.) for third year in a row.

WILSON'S PHALAROPE: rare sighting at IMC mines (PF) on 2 Dec; 8 later seen at IMC mines (JFs, MHw) on 26 Dec.

THAYER'S/HYBRID GULL: unusual bird seen at Ft. Walton Beach Dump (Okaloosa Co.) on 3 Feb with head and bill of a Thayer's gull (first winter); rest of bird lacked Thayer's characteristics and seemed more like a possible Iceland x Thayer's hybrid or leucistic Thayer's (RD).

LESSER BLACK-BACKED GULL: 6 on Fort Lauderdale CBC (Broward Co.) on 17 Dec (ER, JB; high count).

GLAUCOUS GULL: second-year bird observed in Brevard Co. (DL, BL) on 4 Feb.

GREAT BLACK-BACKED GULL: first-year bird at Ft. Walton Beach dump (Okaloosa Co.) on 3 Feb (RD).

ROYAL TERN: uncommon inland; 11 seen at IMC mines (PF) on 2 Dec.

SANDWICH TERN: 47 at IMC mines (CG) on 3 Dec (high count).

LEAST TERN: 1 returned early on 26 Feb to IMC mines (BC).

BLACK TERN: rare in winter; one at IMC mines (DF, BH, MG) on 10 Feb.

BLACK SKIMMER: 200+ at Key West (JO) on 24 Dec; may be staging area before northward movements begin; high winter count of 400 at IMC mines (PF) on 19 Jan.

WHITE-WINGED DOVE: 3 at Archbold Biological Station on 21 Feb for 3rd consecutive year (FeL); expanding into natural areas along Lake Wales Ridge; also at St. Marks NWR on 9 Jan (SC).

BLUE-CROWNED PARAKEET: 1 feeding on Brazilian pepper in Boynton Beach on 9 Jan (BrN); it seemed to enjoy the "home cooking."

SHORT-EARED OWL: irregularly seen at Merritt Island NWR (Brevard Co.; DS) from 2 Jan - Feb.

COMMON NIGHTHAWK and NIGHTHAWK SP: common nighthawk on St. Marks CBC (CC) on 16 Dec; 2 seen on 16 Dec on St. Petersburg CBC (Pinellas Co.; DG); unidentified nighthawk observed at the Doral Country Club (Dade Co.) on 27 Dec (TB).

WHIP-POOR-WILL: cooperative bird observed throughout Feb at Corkscrew Sanctuary (Lee Co.; fide LE); 1 heard calling in northern St. Johns Co. (PP) during period.

BUFF-BELLIED HUMMINGBIRD: southernmost record was at Ft. Lauderdale (Broward Co.); bird first reported here on 27 Dec; last reported on 2 Mar (TC, BaC, m. obs.); 1 also banded in Freeport (Walton Co.; BS, MaS) on 18 Dec.

RUBY-THROATED HUMMINGBIRD: 1 male at the Flamingo campground, Everglades NP on 6 Jan (throat markings observed; BrN, JG); 1 also on the South Brevard CBC on 16 Dec.

BLACK-CHINNED HUMMINGBIRD: female at feeder in St. Petersburg (LH) from 29 Dec - 7 Jan (photos taken); individuals also banded/observed (MaS, BS, JP) at Pensacola (Escambia Co., 19 Dec), Freeport (Walton Co., 18 Dec), and Shalimar (Okaloosa Co., 18 Dec).

CALLIOPE HUMMINGBIRD: a highlight of the season was the sighting of this species in Ft. Walton Beach (Okaloosa Co.) in mid-December; the bird was banded (MaS, BS, m. obs.) and seen as late as 20 Dec (RD).

RUFOUS HUMMINGBIRD: some observed in the Tallahassee area from late Dec through early Jan (DY, NW); 3 banded (BS, MaS) in Pensacola from 19 Dec - 26 Jan; perhaps becoming more common in winter.

EMPIDONAX SP.; unidentified species on Merritt Island CBC on 19 Dec (m. obs.); unusual in winter in central region.

ASH-THROATED FLYCATCHER: 1 at the old Delray Beach sewage treatment plant (Palm Beach Co.) from 19 Jan - 28 Feb (HLg); photos and tape recordings obtained for this unique peninsular record.

GREAT-CRESTED FLYCATCHER: 30 on Lake Placid CBC on 16 Dec (high count); 1 on Lake Wales CBC (m. obs.) on 30 Dec.

WESTERN KINGBIRD: 1 in Polk Co. on 27 Dec where the bird previously wintered (LCo); flock of 5 in Highlands Co. in Feb (MSt, FL, FF); 1 on Tallahassee CBC (JCo, KN) on 1 Jan (co. record).

GRAY KINGBIRD: 1 in Highlands Co. on 21 Feb (FeL, FF).

SCISSOR-TAILED FLYCATCHER: 12 at Key West on 9 Jan (JO: high count); 1 in a field in Polk Co. (DF) where bird apparently wintered previously; 1 on Lake Placid CBC (Highlands Co.) on 16 Dec (m. obs.); 1 also at Medart (Wakulla Co.) on 14 Jan (RL).

HORNED LARK: immature (AL) at Flamingo campground (Everglades NP) on 31 Dec; seen through 5 Jan (m. obs.).

CAVE SWALLOW: 16 returned to Cutler Ridge (Dade Co.) by 18 Feb (PS) for 3rd year in a row.

SPRAGUE'S PIPIT: 1 on St. George Island Causeway (Franklin Co.) on 25 Feb (JoH).

AMERICAN PIPIT: flocks of 20-40 at dairy farms in Hardee Co. (DF) from 19 Dec - 28 Feb (high counts).

CEDAR WAXWING: large flocks throughout south Florida from Jan - Feb; reached south to Key West where 19 observed (JO) on 9 Jan.

WARBLING VIREO: 1 on Lower Keys CBC on 16 Dec; rare anytime in Florida.

BLUE-WINGED WARBLER: 1 on Lower Keys CBC on 16 Dec; 1 also on Lakeland CBC on same day; rare in winter.

TENNESSEE WARBLER: 1 on Merritt Island CBC (Brevard Co.) on 19 Dec; 1 also on St. Marks CBC (CC) on 16 Dec.

NORTHERN PARULA: 6 at Saddle Creek Park (Polk Co.) on 25 Feb (PF); a high count.

BLACK-THROATED BLUE WARBLER: 1 on Merritt Island CBC on 19 Dec (m. obs.).

PRAIRIE WARBLER: began singing as early as 6 Jan in Everglades NP (BrN, JG), perhaps in response to the unseasonably warm weather.

NORTHERN WATERTHRUSH: unusual winter record from M & K Ranch (Gulf Co.) on 9 Dec (HLn).

LOUISIANA WATERTHRUSH: reported along Anhinga Trail, Everglades NP, from 14 Jan - 2 Feb (m. obs.).

HOODED WARBLER: male wintered at Mahogany Hammock (Dade Co.), 27 Dec - 15 Jan (JG).

WILSON'S WARBLER: unusual anytime; 1 in Tallahassee (DJ, SJ) on 23 Dec.

CANADA WARBLER; male at Doral Country Club (Dade Co.) on 24 Dec (TB); a unique winter record for south Florida.

YELLOW-BREASTED CHAT: 1 at IMC mines (BC) on 18 Dec; 1 on Merritt Island CBC (Brevard Co.) on 19 Dec.

SUMMER TANAGER: on 22 Jan, this species became the fourth tanager species seen at a home in Delray Beach (Palm Beach Co.; BH); 1 on Lake Placid CBC on 30 Dec; 1 in Polk Co. on 16 Dec (PF, PeT).

BLUE GROSBEAK: 1 in Miami on 8 Feb.

INDIGO BUNTING: 1 on Fish Creek CBC (Taylor Co.; NW, StJ) on 23 Dec; male in partial molt at St. Marks NWR (Wakulla Co.; JCo, KN) on 12 Feb likely wintered in area.

DICKCISSEL: late record in Polk Co. (PF) on 25 Feb.

GREEN-TAILED TOWHEE: a highlight of the winter season; found (PeT) in an abandoned orange grove in Lake Alfred (Polk Co.) on 7 Jan; bird remained in area until 4 Feb when it was heard singing from a dead orange tree.

CHIPPING SPARROW: large flocks recorded in several unusual places; S. Brevard CBC reported 10x (149) normal number on 16 Dec.

VESPER SPARROW: 1 at Christian Point, Everglades NP, on 17 Feb; uncommon south Florida sighting (EB, RK).

LARK SPARROW: 1 in Boynton Beach (Palm Beach Co.) on 12 Jan (HLg), a rare winter record.

HENSLOW'S SPARROW: 1 at Starkey Wilderness Park (Pasco Co.) during New Port Richey CBC (DG); 1 also on Lakeland CBC on 19 Dec.

FOX SPARROW: high count of 16 observed (NW, StJ) on Fish Creek CBC on 23 Dec (high temperature of 18° F); many of these were in the middle of the road; 7 in Orange Park (Clay Co.; LM) on 23 Dec; also seen on several CBC's.

GRASSHOPPER SPARROW: 1 on Lakeland CBC on 16 Dec; 11 reported (PeT) near Lake Alfred (Polk Co.).

LINCOLN'S SPARROW: 1 at Florida City (Dade Co.) in Jan (m. obs.); 1 on Lake Wales CBC (Polk Co.) on 30 Dec; 1 later near Lake Alfred (Polk Co.) on 7 Jan (PeT).

WHITE-CROWNED SPARROW: unusual reports from central Florida: several in Pasco and Hernando Cos. after pre-Christmas cold snap; first record for Merritt Island CBC (Brevard Co.) on 19 Dec stayed in area through 9 Jan; upwards of 9 seen in a field in Polk Co. (PeT).

DARK-EYED JUNCO: 1 on Lakeland CBC (Polk Co.) south of characteristic wintering range; 1 near Lake Alfred (Polk Co.) on 7 Jan (PeT).

LAPLAND LONGSPUR: 2 at St. Marks NWR (CG) on Dec 4; 1 or 2 pairs on Shell Island CBC (Bay Co.) on 29 Dec (GN, DM, CGi); 2 birds seen by two count groups at different times, which means birds may have been counted twice; recorded on Ponce de Leon Inlet CBC (m. obs.) on 17 Dec.

YELLOW-HEADED BLACKBIRD: 20 found at Lake Harbor (Palm Beach Co.) from 17 Jan - Feb (m. obs.).

COWBIRDS: it had to happen: 3 species (shiny, bronzed, and brownheaded) seen together in Broward Co. (JB, ER) on 19 Jan; similar record in Palm Beach Co. later in Feb.

SHINY COWBIRD: now so widespread as barely to merit mention; 2 males at Flamingo, Everglades NP from 2 Dec - 5 Jan (m. obs.).

BRONZED COWBIRD: 1 observed (HLg) at landfill in Palm Beach Co. (second record for co.) on 9 Jan; 2 at Lake Harbor (BH; Palm Beach Co.) on 21 Jan, third and fourth co. records. Also now in east central Florida: 4 on Lakeland CBC (first co. record) and upwards of 10 at other times (LCo, m. obs.).

NORTHERN (BULLOCK'S) ORIOLE: seems to have staged an irruption into Florida this winter: 1 at Flamingo, Everglades NP, on 31 Dec; 2 seen here on 6 Jan (BrN, JeG); 1 seen in Key West (with 2 Baltimores; JO) on 9 Jan, and another in Tallahassee (VH, BrN, BaN, WN) on 28 Jan. Continuing the trend, two adult males reported from Eco Pond, Everglades NP, on 10 Mar., just outside the formal reporting dates (m. obs.).

AMERICAN GOLDFINCH: staged a major incursion into extreme south Florida during Christmas Count season; disappeared shortly after first of the year; charms of hundreds of birds were numerous, but a flock of 75+ in Key West on 20 Dec was a standout (JO).

PURPLE FINCH: many reports from north Florida from mid-Dec on; late report of 12 in west Jacksonville on 26 Feb (SuJ).

HOUSE FINCH: more widespread throughout northern Florida. First west Florida record occurred during Pensacola CBC (Escambia Co.) with 14 birds seen (RD, JP, (JS); another 14 later seen in Gulf Breeze (Santa Rosa Co.; JP); also seen in new areas of Gadsden and Leon Counties (NW, JCo).

EVENING GROSBEAK: pair observed at feeder in west Jacksonville for a week; left just before 23 Dec freeze (SuJ).

Observer abbreviations: Atherton, Lynn (LA); Baker, Jocie (JB); Ball, J. (JBa); Ballman, Dick (DB); Bennet, Ken (KB); Biggs, Wes (WB); Bledsoe, Ted (TB); Brakhage, Dave (DBr); Bratlie, Byron (ByB); Brendel, E. (EB); Brown, Bob (BBr); Brown, Rex (RB); Cavanagh, Jim (JCa); Center, Barbara (BaC); Center, Ted (TC); Chase, Charlie (CC); Cole, Sam (SC); Conn, David (DaC); Conn, Linda (LiC); Cooley, Dwight (DC); Cooper, Buck (BC); Cooper Linda (LCo); Cox, James (JCo); Cully, Walter (WC); Douglas, John (JD); Duncan, Robert A. (RD); Eason, Loris (LE); Fellers, Paul J. (PF); Fickett, Steve (SF); Fisher, Joe (JFs); Fitzpatrick, John (JFp); Ford, Clarice (CF); Ford, Don (DF); Frazier, Frank (FF); Geanangel, Chuck (CG); Gezovich, Pete (PG); Gidden, C.S. (CGi); Ginzburg, Mark (MG); Goodwin, Jeff (JeG); Goodwin, David (DG); Gould, Lynn (LG); Gould, Jay (JaG); Harrel, Mark (MHl); Hartsaw, Mae (MHw); Heller, Victor (VH); Hopkins, Larry (LH); Hutto, Paul (PH); Hinshaw, Janet (JaH); Hintermister, John (JoH); Hope, Brian (BH); Hough, C. Royce (CH); Huggelston, Al (AH); Jarvis, Sue (SuJ); Jones, Steve (StJ); Jue, Dean (DJ); Jue, Sally (SJ); Krinsky, R. (RK); Langridge, Howard (HLg); LeRoy, Beverly (BL); LeRoy, Donn (DL); Loftin, Horace (HLn); Loftin, Robert (RL); Lohrer, Fred (FL); Lotz, Aileen (AL); McCullagh, Lenore (LM); Mehlman, David (DM); Menart, Tony (TM); Nelson, Gil (GN); NeSmith, Katy (KN); Neville, Barbara (BaN); Neville, Bruce (BrN); Neville, Wayne (WN); Olle, Dennis (DO); Ondrejko, Joe (JO); Porrino, Carolyn (CP); Powell, Peggy (PP); Pranty, Bill (BP); Pfeiffer, James (JP); Richardson, Jim (JRi); Rodgers, Jim (JRo); Rosenberg, Ed (ER); Rosenberg, Gary (GR); Russel, Will (WR); Sandee, Daan (DaS); (Sargent, Bob (BS); Sargent, Martha (MaS); Saunders, Jim (JS); Simpson, David (DS); Smith, O'Hara (OS); Smith, P. William (PS); Stapleton, Martin (MSt); Stevenson, Henry (HS); Stolen, Eric (ES); Tetlow, Phil (PhT); Timmer, Pete (PeT); Trunk, Paul (PaT); Wamer, Noel (NW); Will, Robin (RW); and Woolfenden, Glen (GW).

REPORTS

Florida Field Naturalist 18(3): 67, 1990.

Summary of the 1990 Spring Meeting.—The spring meeting of the Florida Ornithological Society was held at the Sheraton Harbor Place in Fort Myers, Florida, from 4-6 May. The Audubon Society of Southwest Florida was the host chapter, and Cindy Bear was the local committee chair.

During the board meeting, it was reported that the FOS Checklist is in final draft. The Board voted to award the Helen G. and Allen D. Cruickshank Research Award of $500 to Dr. Kenneth Meyer of the University of Florida for work on the "Social Behavior and Demographics of the American Swallow-tailed Kite in Florida." The Board also gave $500 to the Florida Breeding Bird Atlas project. The Board extended an invitation to the Wilson Ornithological Society to hold a joint meeting in Florida in the spring of 1992. Lake Region Audubon Society has volunteered to host the meeting in the Orlando/Kissimmee area. During the annual membership meeting on Saturday, Dan Click, Judi Hopkins, and Bill Smith were elected Directors.

The Saturday afternoon paper session on Florida kites was moderated by Dr. Kenneth Meyer. Mr. John Cornutt spoke on the Black-shouldered Kite in Florida. Dr. Meyer spoke on the American Swallow-tailed Kite, and briefly, on the Mississippi Kite. Dr. James Rodgers spoke on Snail Kites. Dr. William Robertson provided concluding remarks on kites of the world.

The skin quiz was prepared by Dr. J. W. Hardy of the University of Florida. In addition to skins, it included bird calls to be identified and matched with sonograms. Herb Kale won the skin quiz.

After the banquet, Drs. Hardy and Kale spoke of the contributions of two prominent members of FOS who passed away in recent months. Dr. Hardy spoke of Johnnie Johnson, and Dr. Kale spoke of Johnnie Fisk. The banquet entertainment was provided by Storytellers of Sanibel, Bert and Noel MacCarry, who told folktales of birds and other wildlife from around the world.

Field trips were held to Six Mile Cypress Swamp, Cape Coral, Ding Darling National Wildlife Refuge, the Nature Center of Lee County, Bowman's Beach, and Cayo Costa Island.

The usual good time was had by all. The fall meeting will be 12-14 October in the Tallahassee area. Tall Timbers Research Station will be the host "chapter." The spring 1991 meeting will be in Tampa; no date has been set for the spring meeting.—**Bruce Neville**, 8221 SW 72 Ave., #273, Miami, Florida 33143.

Florida Field Naturalist 18(3): 67-68, 1990.

FOS Records Committee Report.—This is the fifth report of the Florida Ornithological Society Records Committee, covering 1987. It contains 20 records of which 14 were accepted and 6 were not accepted. One record (87-124) was withdrawn. Committee members are Jocelyn Lee Baker (secretary), Wally George, Larry Hopkins, Rebecca Payne and Henry Stevenson.

Sightings of rare birds in Florida should be submitted to the secretary of the Records Committee. All records published thus far have been placed in a permanent file in the FOS Archives at the Florida Museum of Natural History in Gainesville where they are available for research. Documentation for birds listed in this report was submitted by: Brooks Atherton, Lyn Atherton, Jane M. Brooks, L. Page Brown, James E. Cavanagh, Robert L. Crawford, Robert A. Duncan, Davis W. Finch, Wally George, Wayne Hoffman, Johnnie Johnson, Howard P. Langridge, James Layne, Bruce Neville, Rebecca L. Payne, P. William Smith, Hal Wiedmann and Glen Woolfenden.—**Jocelyn Lee Baker**, Secretary, 851 North Surf Road, Apartment #302, Hollywood, Florida 33019.

FOS Records Committee Report—1987

Number	Date received	Species	Date observed	Location (County)	Decision
87-110	8 January 87	Arctic Loon	15 December 79	Wakulla Beach (Wakulla)	Accepted
87-121	5 August 87	Cinnamon Teal[1]	10-28 April 87	Tierra Verde (Pinellas)	Accepted
87-127	26 December 87	Ferruginous Hawk	15 December 87	Everglades NP (Dade)	Not Accepted
87-128	26 December 87	Ferruginous Hawk	18 December 87	Boot Key (Monroe)	Not Accepted
87-109	14 February 87	Prairie Falcon	8 October 86	Longino Ranch Rd. (Sarasota)	Not Accepted
87-117	24 July 87	Caribbean Coot[1]	28 June 87	Loxahatchee NWR (Palm Beach)	Not Accepted
87-115	2 June 87	Black-tailed Godwit	30 April 87	Flamingo, ENP (Monroe)	Accepted
87-112	7 February 87	Hudsonian Godwit	20 September 85	Sharps (Brevard)	Accepted
87-111	25 January 87	Stint (species)	30 November 85	Alligator Point (Franklin)	Not Accepted
87-113	14 February 87	Curlew Sandpiper	18 November 86	Cudjoe Key (Monroe)	Not Accepted
87-125	8 October 87	Curlew Sandpiper	3 October 87	248th St./102nd Ave. (Dade)	Accepted
87-118	27 July 87	Marbled Murrelet	27 December 86	Honeymoon Isl. (Pinellas)	Accepted
87-120	31 July 87	Atlantic Puffin	6 December 86	Jupiter (Martin)	Accepted
87-114	24 March 87	Key West Quail-Dove	24 March 87	Marathon (Monroe)	Accepted
87-123	5 August 87	Brown-crested Flycatcher	3 November 85	Ft. DeSota Park (Pinellas)	Accepted
87-129	26 December 87	LaSagra's Flycatcher	22 December 87	Elliott Key (Dade)	Accepted
87-122	5 August 87	Black-headed Grosbeak[1]	20-28 April 87	Ft. DeSota Park (Pinellas)	Accepted
87-126	12 December 87	Black-faced Grassquit[1]	6 December 87	Port Everglades (Broward)	Accepted
87-119	31 July 1987	Dark-eyed Junco	8 May 87	Merritt Isl. NWR (Brevard)	Accepted
87-116	12 June 87	Shiny Cowbird	31 May 1987	Flamingo, ENP (Monroe)	Accepted

[1]Documentation includes photograph.

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INFORMATION FOR CONTRIBUTORS

The Florida Field Naturalist is a fully refereed journal emphasizing biological field studies and observations of vertebrates, especially birds, in and near Florida and the nearby West Indies. It welcomes submission of manuscripts containing new information from these areas. Please consult recent issues for style, and Vol. 18, No. 1 for detailed information. Submit manuscripts for consideration to the editor James A. Rodgers. Monograph-length manuscripts may be submitted for consideration to the Editor of Special Publications John William Hardy. Send books and other materials for review to Associate Editor Sheila A. Mahoney. Send copies of recent literature on Florida birds to Special Editor Fred E. Lohrer. For preliminary assistance regarding submission of manuscripts dealing with bird distribution and rarities contact Associate Editor Howard P. Langridge. Reports of rare birds in Florida should also be submitted to the FOS Records Committee Secretary Jocie Baker. For preliminary assistance regarding submission of scientific, technical, or behavioral contributions contact Associate Editor Richard T. Paul.

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SPECIES CONTENTS IN PELLETS OF THE BARN OWL FROM A CENTRAL FLORIDA WETLAND

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Abstract.—Barn Owl (*Tyto alba pratincola*) pellets, collected near an artificial wetland, revealed that prey items consisted mostly of rodents, especially *Sigmodon hispidus*. Insectivores and birds also made up a large percentage of the Barn Owl's diet.

Analysis of regurgitated owl pellets provides valuable information on feeding habits of the owls and distributions of the prey species. Pellets of the Barn Owl (*Tyto alba*) are commonly used in such studies (Trost and Hutchinson 1963, Banks 1965, Hamilton and Neill 1981, and Fritzell and Thorne 1984) because these owls tend to return near buildings to regurgitate the pellets, making collection easy.

Trost and Hutchinson (1963) published the first account of Barn Owl diets for the central Florida area based on a study from Marion County. Our study appears to be only the second such work done in Florida. In this study we examine the prey items of pellets from a wetland in central Florida.

METHODS

The pellets were collected from the Orlando Wilderness Park, located near Christmas, Orange County, Florida between March and October 1987. The "artificial wetland" serves as a filtration system for treated wastewater from the city of Orlando. Forty pellets were collected from the concrete floor beneath the rafters of a picnic pavillion that was used as a roosting site for a Barn Owl. The roost was bordered by an oak hammock and by a marsh. Trost and Hutchinson (1963) had similar habitat ("marshy and bushy fields") near their collection site. Measurements of size (longest length along each axis) and dry weight were taken before each pellet was opened. Species were determined from pellets through identification of crania and occasionally from other skeletal material, and were confirmed by comparison with a key (Glass 1973) and with specimens from the University of Central Florida collections.

Florida Field Naturalist 18(4): 69-73, 1990.

Results

The number of prey items per pellet did not always correlate with pellet size. For example, the largest pellet (95 cm in length, 19.0 g) contained one prey item, whereas one average-sized pellet (51 cm in length, 4.4 g) contained four items. The difference in the size of the prey species probably accounts for this. Eighty percent of the pellets contained only one prey item, and this item was frequently a larger prey species, such as a rat. We found a shrew, a small prey species, by itself in only one pellet. The highest number of prey species in one pellet was four, while the mean number of prey species per pellet was 1.4.

Fifty-five prey items representing nine species were identified (Fig. 1). These species (n = total numbers of individuals) were: cotton rat, *Sigmodon hispidus* (17); southeastern short-tailed shrew, *Blarina carolinensis* (13); round-tailed muskrat, *Neofiber alleni* (8); marsh rice rat, *Oryzomys palustris* (8); Savannah Sparrow, *Passerculus sandwichensis* (3); least shrew, *Cryptotis parva* (2); eastern harvest mouse, *Reithrodontomys humilis* (2); opossum, *Didelphis virginiana* (1); and Eastern Meadowlark, *Sturnella magna* (1). The opossum was a partially consumed juvenile with the cranium absent.

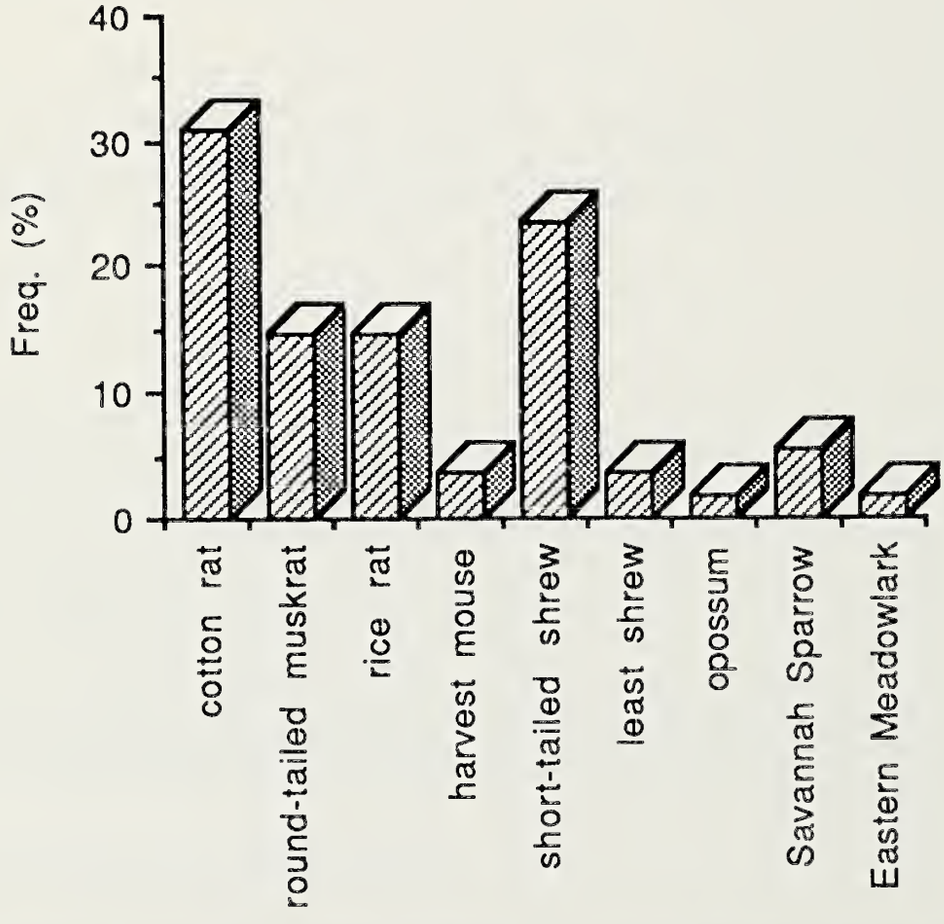

Figure 1. Percent composition of Barn Owl pellets by prey species.

Percent composition by species of prey items found in the pellets is shown in Fig. 1. Out of the 55 items found, cotton rats were the most numerous species (30.9%), followed closely by *B. carolinensis* (23.6%). Round-tailed muskrats and rice rats each comprised 14.6% of the total. The remaining 16.4% consisted of the five other species.

Percent composition of prey items by order is given in Fig. 2. Rodents accounted for 63.6% of the total. The two shrews (Order Insectivora), comprised 27.3%. Birds contributed 7.3% of the total diet, and the marsupial accounted for 1.8%.

Various insect parts, primarily orthopteran, were found in several pellets. Some tarsals came from mole crickets (Gryllotalpidae), and several femurs were large and well-developed, which would indicate grasshopper species. A head fragment was clearly from a cone-headed grasshopper (Tettigoniidae). These insect-containing pellets were mostly comprised of either avian or insectivoran species.

DISCUSSION

Rodents generally comprise the largest percentage of prey items in Barn Owl diets. Several factors may account for this, such as the relative abundance of rodents, their high food value, and the nocturnal habits of both owls and rodents. Also included in their diet may be smaller numbers of birds, reptiles, amphibians, and insects (Bent 1938, Phillips 1951, Boyd and Shriner 1954, Cunningham 1959, Tedards 1963, Earhart and Johnson 1970, Bealer 1980, and Adams et al. 1986). Banks (1965) found remains of unidentified bats, as well as several seabirds, in pellets collected from Islas Los Coronados, Baja California. Fritzell and Thorne

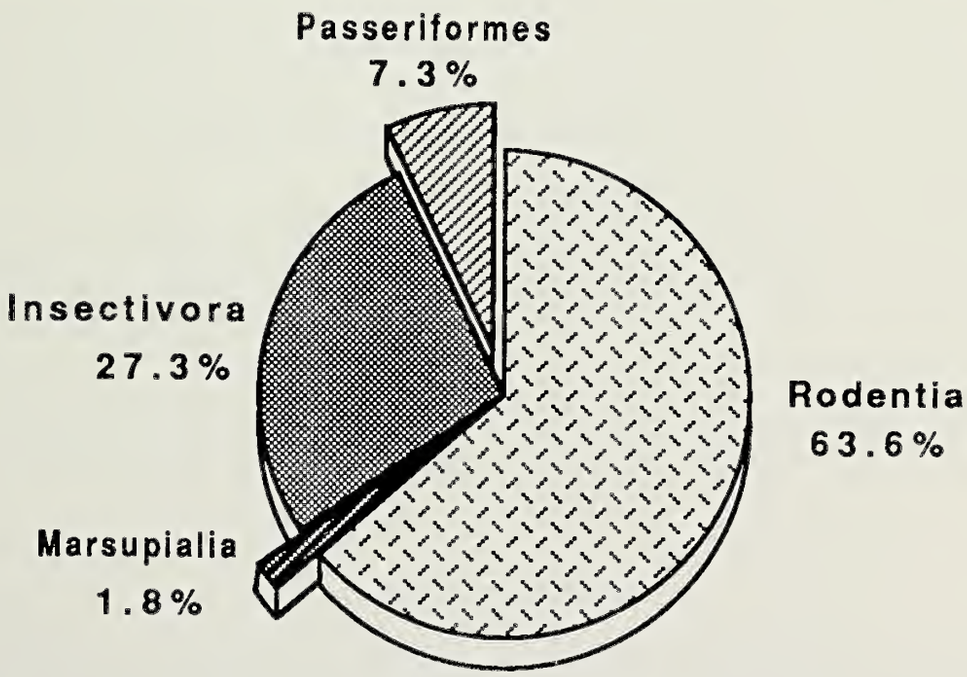

Figure 2. Percent composition of Barn Owl prey items by order.

(1984) describe an instance where a Barn Owl preyed mostly on "blackbirds" (Red-winged Blackbirds, Rusty Blackbirds, Starlings, and a Grackle). This, they explain, was due either in response to low mammal density or to exploitation of an abundant supply of birds.

Cotton rats appear to be the main prey species of Barn Owls in the southearn United States. Hamilton and Neill (1981) found *S. hispidus* the most common species preyed upon in Texas, comprising 56.6% of Barn Owls' diet, and Tedards (1963) gave a total of 43.0% in South Carolina. Adams et al. (1986) found that *Sigmodon* accounted for a mean percentage of 13.8% in North Carolina. A large percentage of the diet of Barn Owls living in the northeastern United States is comprised of the meadow vole, *Microtus pennsylvanicus* (Bent 1938, Stearns 1950, Phillips 1951, Boyd and Shriner 1954, and Adams et al. 1986), an ecologically equivalent species to the cotton rat. Coincidental habitat preference of both may also explain the large percentage of rodents accounted for in Barn Owl diets, as well as the species of rodents consumed. Thus, field-dwelling and semi-aquatic species predominate over forest species, such as the common cotton mouse (*Peromyscus gossypinus*).

Bealer (1980) states that insects may play a significant part in the diet of Barn Owls at certain times of the year, and other authors include insects as prey items (Bent 1938, Earhart and Johnson 1970). We feel, however, that the insects are not consumed directly. Our pellets which contained insect parts always held the bones of insectivorous prey items (shrews and birds). The presence of mole crickets would seem to indicate that this species was consumed underground by the shrews that were also found in those particular pellets. Further, the small amounts of exoskeleton material would indicate partial digestion of the insects prior to pellet formation. The cone-headed grasshopper, a common grassland species, was found in pellets containing only skeletal material of the two bird species that are common in grassland habitat. Given the apparent abundance of the vertebrate species, it hardly seems likely that the owls would pursue and consume these insects.

We have also noted that size of each pellet is related to the prey species and not the number of items consumed. Larger prey species (e.g., cotton rats and round-tailed muskrats) are usually found singly in the larger pellets.

Barn Owls living in central Florida appear to be opportunistic; rodents are preferred, however, other mammals and some birds are also taken.

Acknowledgments

We wish to thank the following individuals for their assistance with this research: Jim and Sissy Burney, Steve Clark, Jamie Guseman, John Lesman, and Susan Schuerger.

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THE FISH CROW (*CORVUS OSSIFRAGUS*) AND ITS MEXICAN RELATIVES: VOCAL CLUES TO EVOLUTIONARY RELATIONSHIPS?

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Abstract.—The Fish Crow (*Corvus ossifragus*), ranging from the New England coast of the U.S.A. southward to Florida, along the Gulf of Mexico to central coastal Texas, and inland up certain rivers, the Tamaulipas Crow (*C. imparatus*), native to the eastern lowlands of Mexico, and the Sinaloa Crow (*C. sinaloae*), of the Pacific coast lowlands of Western Mexico, form a superspecies. These forms do not meet in the wild. The species-specific adult calls are remarkably different in each species. I kept Fish Crows and Tamaulipas Crows in an aviary and the latter species bred successfully. I studied the development of voice in young from nestling stage (July-August) to full-grown (January). Fledgling Tamaulipas Crows sound like adult Fish Crows; the voice changes gradually, and by completion of the pre-basic molt, the birds sound like their parents. I believe, as discussed, that the Tamaulipas Crow is derived from the Fish Crow, and that the peculiar, guttural, frog-like sounds of the Tamaulipas Crow are derived. Biochemical studies are needed for further elucidation of North American *Corvus* evolutionary relationships.

From 1985 to 1988, I kept from six to nine Tamaulipas Crows (*Corvus imparatus*) in captivity in a large outdoor aviary, studying their social behavior, nesting, and vocalizations. This crow in maturity has a highly distinctive, guttural, frog-like voice. It is considered conspecific with the Sinaloa Crow, as the Mexican Crow (*C. imparatus*) by the AOU checklist (AOU 1983) and is morphologically almost identical to that western form. I consider them separate species, the Tamaulipas Crow, *C. imparatus*, and the Sinaloa Crow, *C. sinaloae*. A third species, the slightly larger Fish Crow (*C. ossifragus*) is almost certainly a close relative of the two Mexican forms, and, in fact, they were all considered conspecific (as races of *ossifragus*) at one time (Hellmayr 1934). The ranges of these three crows are shown in Fig. 1. Note that there is no geographic contact among the three. My first interest in these birds was excited by the remarkable difference between the voices of the Tamaulipas and Sinaloa forms. This difference, first brought to the attention of ornithologists by Davis (1958) caused him to recommend that they be considered separate species. The Fish Crow's voice also is distinctive, and, as crows go, these three, almost certainly each others' closest relatives and forming a superspecies, could hardly have more easily distinguishable vocalizations. The difference in structure of the sounds is shown in Fig. 2.

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My first research plan was to attempt hybridization and cross-fostering of these three crows in the aviary, which proved, for me, impossible.

In the course of my work, Tamaulipas Crows did nest successfully on two occasions in the aviary (1985, 1987) and on two other occasions produced young that did not survive. The three young that survived to adulthood in 1987 are the subject of this paper and they were studied through their first 6 months of ontogenetic development, with special attention given to voice. In an earlier paper dealing with breeding Tamaulipas Crows in captivity (Webber and Hardy 1985), characteristic calls of all three species of crows mentioned above were presented and Fig. 1 f, g, of the 1985 paper showed how a call of a captive juvenile Tamaulipas Crow resembled one call of wild adult Fish Crows. This call was the simple *caw* that has homologues in many *Corvus* species (see, for example, Hardy 1990). By itself this call is rather uncommon in Fish Crows, which are given to such a variety of more complex tonally variable social conversation vocalizations. The simple *caw* is, however, the elemental alarm call of this species. The present paper found its initial stimulus in the resemblance of a call of juvenile Tamaulipas calls to the Fish Crow *caw*.

METHODS

Throughout the nestling periods, the aviaries were visited daily to provide food (high protein dog meal, chopped apples, grapes, sliced oranges, plus live crickets and meal worms

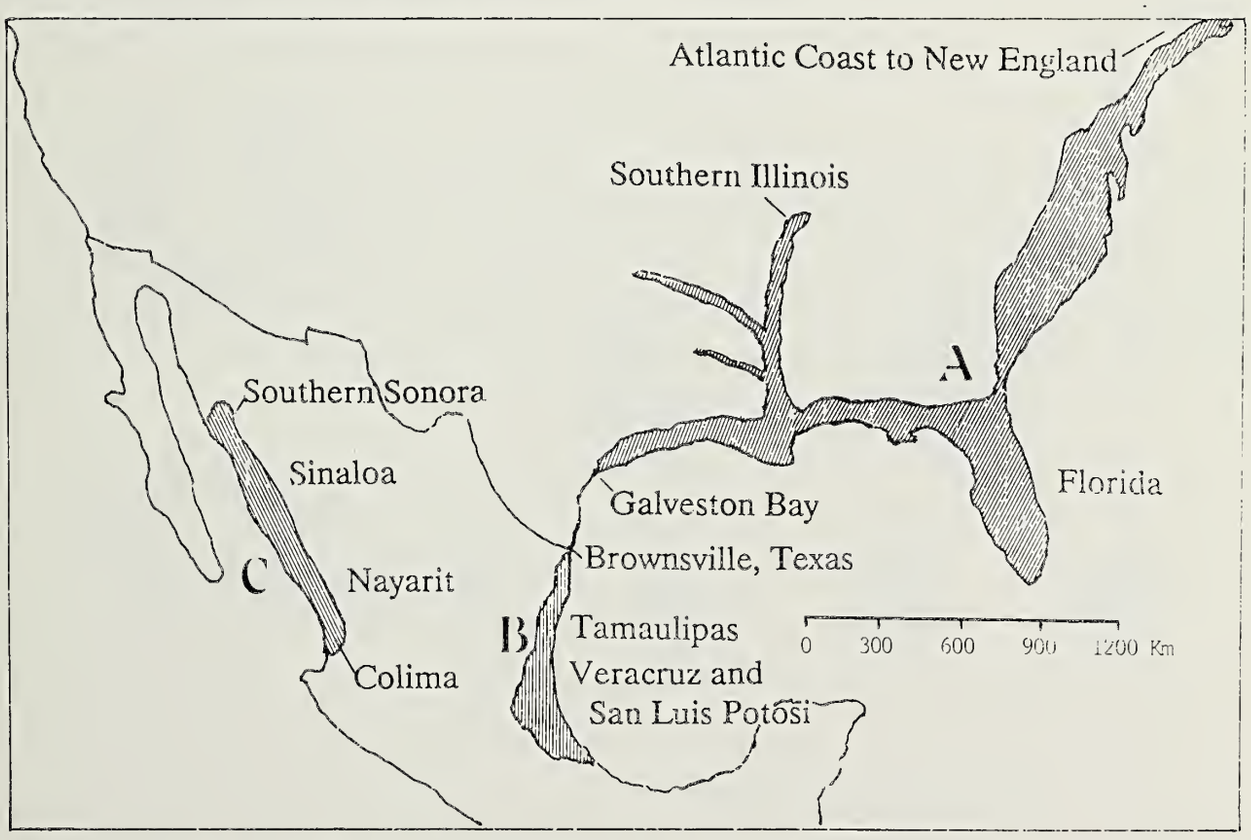

Figure 1. Map showing geographic ranges of A. Fish, B. Tamaulipas, and C. Sinaloa crows.

during the nestling periods). The adults fed the young mostly live food. On these aviary visits, changes in vocalizations from the faintest squeaks of hatchlings to the harsh sounds of fledglings were noted and sometimes tape recorded. After the young were fledged, the aviaries were visited three or four times per week, with tape recording of voice continued when changes were noted.

Recordings were made on a Stellavox SP-7 open reel and a Sony WMD6-C Professional Walkman cassette recorder, using various condenser microphones (such as Sennheiser K3U-ME 80 and Audio-Technica AT-9300 models). The recordings, some illustrated in this paper, were analyzed on a Kay Elemetrics Sona-Graph, model 7029-A, using the wide (300 Hz) band pass filter. The tape recordings referred to in this study were all contained on Master Tape 954 in the Bioacoustic Archives of the Florida Museum of Natural History.

Results

By the time nestling Tamaulipas Crows are almost fully feathered, and ready to leave the nest (25-28 days old), they have strong vocal abilities, although not a varied repertoire. As Fig. 3 shows, their cawing calls are remarkably similar to *caws* of adult Fish Crows. These calls are only faintly guttural, and show moderately clear tonal intervals. The narrow intervals between successive tones suggests that two-voice syringeal source unique to birds (Borror and Reese 1956; Greenewalt 1968). The sound has a falsetto quality (hear the voice of adult Fish

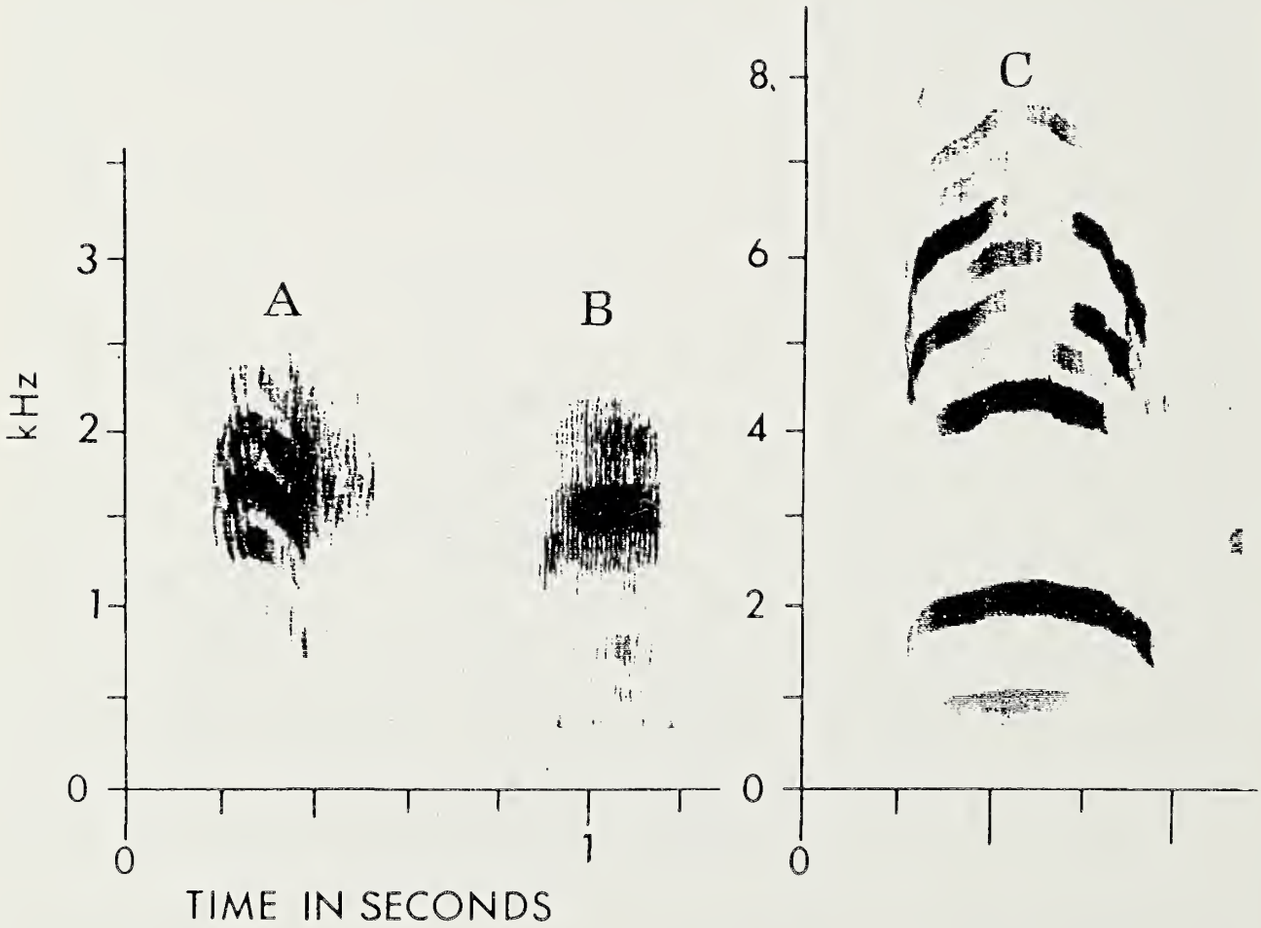

Figure 2. Sonograms of the most characteristic, loud, species-specific vocalizations of: A. Fish Crow; B. Tamaulipas Crow; C. Sinaloa Crow.

Crows on Hardy 1990). The young Tamaulipas Crow voice in Fig. 3 was recorded on 17 August 1987, when it was about 9 days out of the nest.

On 10 September, there was little physical change in the voices of the juveniles, although the second sonogram (Fig. 4) illustrates a call that has a harsh terminal sound and an overall slightly noisier character. On 17 September and continuing through mid-October (Fig. 4 A-E), the even, arched tonal components of the birds' voices are broken and a gutturality (marked by the vertical segmentation) is evident.

This intermediate character—midway between adult Fish Crow and Tamaulipas Crow vocal character—persisted into early November. This stage was accompanied by the long-protracted first pre-basic (post-juvenal) molt of these birds, which involves all feathers except rectrices and remiges. Fig. 4F and G, from recordings made on 17 November, are of first year birds that had completed their molt and whose voices now more closely resembled the voices of adults of their own species. They retained only the merest trace of tonal structure and the dominating structural feature was the gutturality shown in the vertical segmentation in the sonogram.

Fig. 5, of sounds made by the young birds at about 6 months of age in January 1988, displays vocal character that is indistinguishable from that of their parents, with exquisitely precise vertical segmentation (like a fine-toothed comb) superimposed on one or two tonal centers. The young birds still lack repertoire, but in their cawing sounds they are Tamaulipas Crows.

DISCUSSION

I judge the significance of the above results to be in accord with Haeckel's Law that ontogeny recapitulates phylogeny. Thus, the odd-voiced Tamaulipas Crow is a close, derived relative of the Fish Crow. The Tamaulipas Crow's voice is the derived state, and the Fish Crow's voice is the primitive state, as discussed below. Young Fish Crows, I think

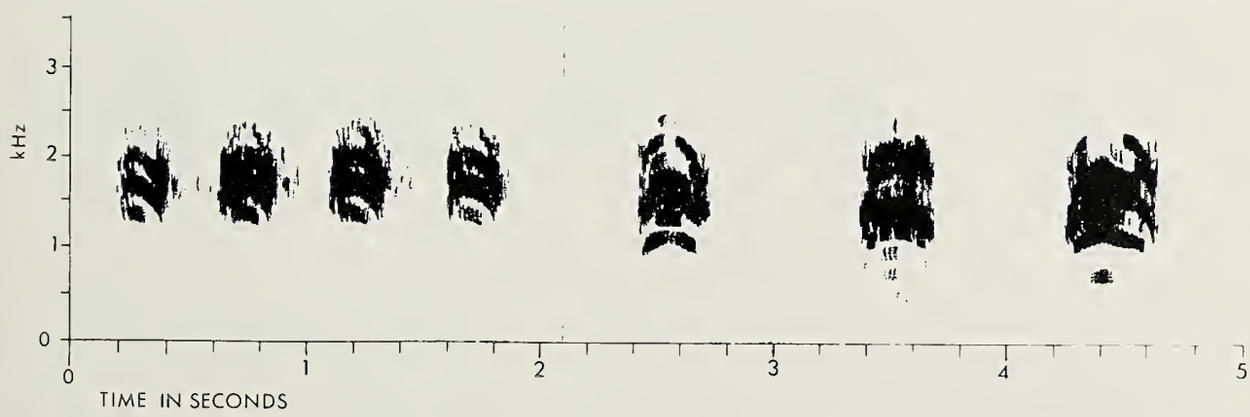

Figure 3. Sonograms of: left, adult Fish Crow; right, juvenal Tamaulipas Crow, about 9 days out of nest (ca. 39 days old).

significantly, sound very much like their parents, again lacking repertoire variety but having the same voice quality. One referee of an earlier version of this paper suggested an alternative hypothesis: that the Fish Crow is a neotenous, derived relative of the Tamaulipas Crow. However, some cawing vocalizations of the Fish Crow are very similar to such calls of the American Crow (*C. brachyrhynchos*), the Northwestern Crow (*C. caurinus*), and the Common Raven (*C. corax*) (hear on Hardy 1990). The

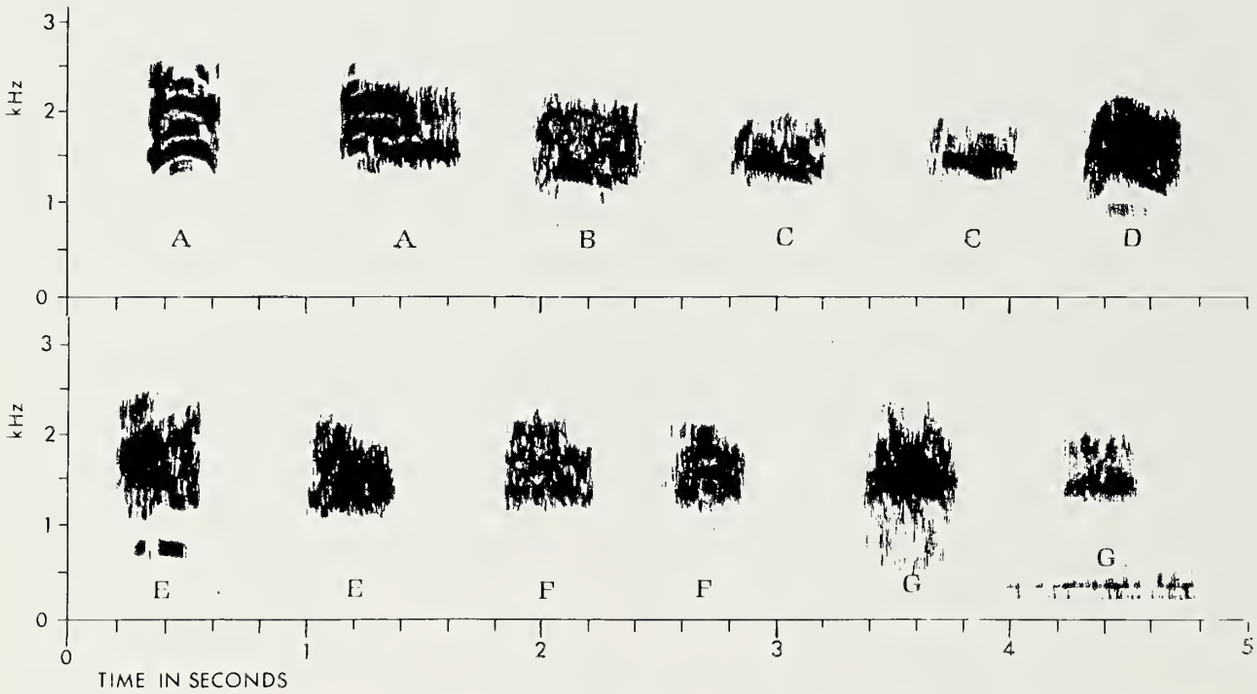

Figure 4. Sonograms of typical calls of young Tamaulipas Crows during post-fledgling through prebasic molt stages during 1987: A. 10 September; B. 17 September; C. 1 October; D. 12 October; E. 17 October; F. G. 17 November. These calls were losing their tonality and gaining vertical segmentation by mid-November.

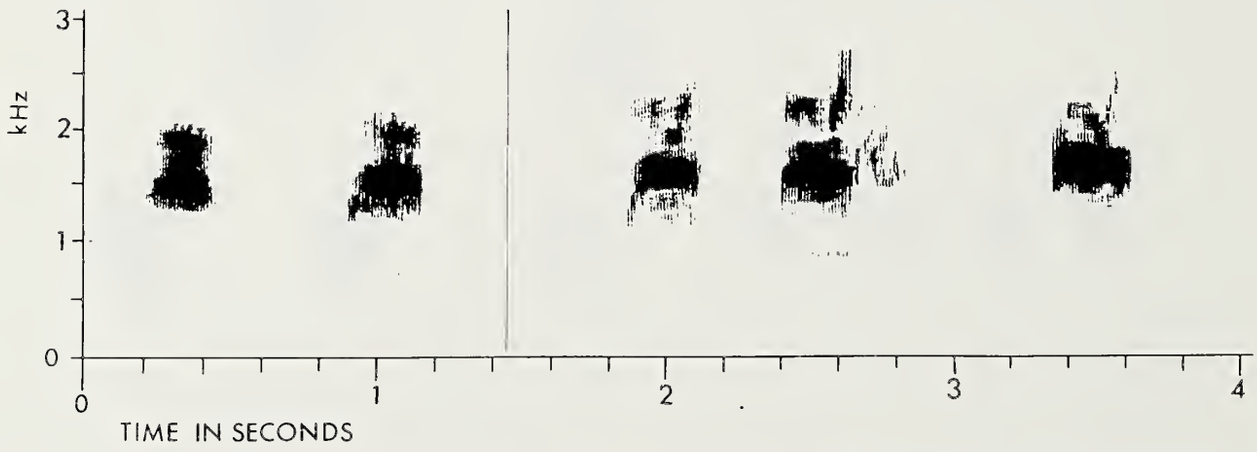

Figure 5. Sonograms of typical calls of: left, 6 month-old Tamaulipas Crows (in January 1988, molt completed); right, adult Tamaulipas Crows, illustrating that they were indistinguishable from each other.

widespread American Crow's cawing closely resembles that of the Palearctic Carrion Crow (*C. corone*) (hear on Kettle 1987). These two species are remarkably similar in nature, according to my personal observations. It is established beyond reasonable doubt (Mayr 1946, Sibley and Ahlquist 1983) that the crow-jay family (Corvidae) is part of the Australian Passerine assemblage (group III, Robin-Whistler-Monarch-Crow) that evolved from a single ancestral taxon, beginning ca. 65 MYA, near the Cretaceous-Tertiary boundary. Moreover the genus *Corvus* is represented by over 30 species in the Old World (Goodwin 1976), and these species show a great amount of morphological variation. In contrast there are only 10 to 12 species in the New World including Hawaii (AOU 1983). These show comparatively little morphological variation. One, the Common Raven (*C. corax*) is Holarctic in distribution, and another, the Carrion Crow, as discussed above, seems to be very closely related to the New World American Crow. Zoogeographically, therefore, American crows most closely resembling the Old World ancestral stock are those occurring north of Mexico. Based on this fact and on vocalizations as analyzed here, it would seem that the Tamaulipas and Sinaloa crows, not the Fish Crow, are the derived forms. The genus *Corvus* being of Old World origin, colonization of the New World has been from Holarctic to Nearctic to Neotropical.

I judge the North American crows to be an especially ripe topic for further systematic study. I wonder what young Sinaloa Crows sound like? I predict they will not sound much like their parents! I have already pointed out (Hardy 1979) how I believe that Sinaloa Crow-Beechey Jay (*Cyanocorax beecheii*) interaction may have led to the crow's evolvement of such an uncrow-like voice. There also is a clear need for biochemical studies that should shed light on the degree of relationship among North American crow species. Accordingly, near the close of the present investigation, Michelle Tennant and I extracted liver, heart, and pectoral muscle tissues of captive Tamaulipas and Fish Crows. These are in the frozen tissue bank of Dr. Michael Miyamoto, Department of Zoology, University of Florida. We need similar tissues of Sinaloa Crows, and ideally of the other North American *Corvus* before such studies. At this time I am not aware of any Sinaloa Crow tissues in preservation for biochemical analysis.

ACKNOWLEDGMENTS

I thank Tom Webber and the late Laurence Alexander for assistance in maintaining the birds in captivity. I also thank Amadeo Rea of the San Diego Natural History Museum and William D. Toone of the San Diego Wild Animal Park, San Diego, California, for arranging for me to receive the crows used in this study. I appreciate the guidance and cooperation of Michelle Tennant in the taking and preservation of body tissues for biochemical study and Michael Miyamoto for providing space for these frozen tissues in his laboratory.

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ANNOUNCEMENT

The Florida Ornithological Society announces its 1991 Helen G. and Allen D. Cruickshank Research Award in the amount of $500.00 for research dealing with Florida birds. Applicants should submit three copies of a proposal outlining goals, significance, feasibility and budget (including other funding anticipated) and a resume by 15 February 1991 to John W. Fitzpatrick, Archbold Biological Station, P. O. Box 2057, Lake Placid, Florida 33852. The recipient will be announced at the FOS spring meeting in April 1991.

NOTES

Florida Field Naturalist 18(4): 81-82, 1990.

Blue Jay Mimics Osprey

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The Blue Jay (*Cyanocitta cristata*) commonly utters a call that sounds remarkably similar to the *kee-arr* vocalization of the Red-shouldered Hawk (*Buteo lineatus*). This well-known fact is commonly mentioned in handbooks and field identification guides (e.g., Chapman 1939: 389, Bent 1946: 47, Peterson 1980: 208). Furthermore, both Chapman and Peterson state that the jay gives a similarly slurred call resembling that of the Red-tailed Hawk (*B. jamaicensis*), and Chapman mentions imitation of the American Kestrel (*Falco sparverius*). Here I report a Blue Jay giving calls that were strikingly similar to the piping notes of the Osprey (*Pandion haliaetus*), which are very different from the slurred calls of the *Buteo* hawks and repeated "killy" calls of the kestrel.

All my observations are from the north side of Jupiter Inlet in Jupiter Inlet Colony, Palm Beach County, Florida, where the Loxahatchee River flows into the Atlantic Ocean. Each summer one or two Ospreys may frequently be seen here flying over the water or perching in *Casurina* trees along the River, from which perches they sometimes call. In late June or early July 1988 I first heard what I took to be the common call of the Osprey: a lengthy train of loud, short cries or whistles. After searching in vain for the bird, I realized that I was entirely fooled, and the calls were actually coming from a Blue Jay perched high in a tree overlooking the Inlet. My notes of 26 July read "1730-1800 . . . Blue Jay in *Casurina* calling just like Osprey, now about the 10th time I've heard this in the Colony this summer." Despite many jays around my house just two blocks away from the Inlet, I never heard this "Osprey-call" anywhere but in the immediate vicinity of the Inlet. From 22 December 1988 to 2 January 1989 I made repeated visits to the Inlet with a tape recorder, experiencing the frustration of not hearing the call—except on 30 December, when my fieldbook notes "0710-0745 . . . heard blue jay giving osprey call (once) but did not have recorder w/ me." Subsequent periods at Jupiter (in March-April 1989, December 1989-January 1990, and May 1990) failed to provide any further repetitions of the call.

F. E. Lohrer has called my attention to a recent note by Atkins (1989), who heard a Blue Jay giving the whistled call of the Osprey on Cedar Key (Levy County), Florida. Atkins was watching a nesting pair of Ospreys calling when hearing a "third" bird nearby, which turned out to be a Blue Jay giving so perfect an imitation that the observer was "completely fooled."

The "raptor" calls of the Blue Jay present at least two interesting questions. One is whether or not jays learn these calls from the other species. Peterson (1980: 208) said simply that the Blue Jay "mimics the calls of Red-shouldered and Red-tailed Hawks"; Chapman (1939: 389) used the term "imitates." However, Bent (1946: 47) was more cautious about the jay's "reputation as an imitator" of raptor calls, stating that "it is difficult, perhaps impossible, to be sure that such cases are not coincidence, especially when we recall the multiplicity of the jay's vocabulary." I concur with Bent's caution, but my observations do suggest that one Blue Jay, which lived in a specific site where Ospreys often perched and called, learned the call from the other species. Furthermore, reports of Blue Jay calls resembling those of several different kinds of raptors renders mere coincidence unlikely.

A more difficult question to answer is why the Blue Jay has evolved raptor calls (regardless of whether the evolution has been directly by acoustical convergence or indirectly through the ability to mimic the calls). At least four hypotheses may be proposed. (1) One possibility is that the jay uses such calls iconically: that is, gives the call to indicate that the particular raptor species is in the vicinity. I never heard either the Red-shouldered Hawk or Osprey calls given when the raptor species was present, although Atkins (1989) did. (2) A related and more likely possibility is that a jay is indicating to companions the site where such a raptor was in the past. All my observations were within 10 m of where Ospreys had been seen. This hypothesis also gains credence from the fact that Ospreys are known to take a variety of non-fish prey, including corvids and some passerines the size of Blue Jays (Wiley and Lohrer 1973). Furthermore, Northern Mockingbirds (*Mimus polyglottos*) were seen mobbing an Osprey (Wiley and Lohrer 1973). (3) Yet another possibility is that the jay is calling to deceive some third species into believing a raptor is present, although the possible benefit to the jay from such deception is unclear. Finally, (4) it might be simply that jays incorporate environmental sounds into their repertoires, and preferentially choose the loud and fairly simple calls of raptors because they are easy to produce. Hypothesis (2) seems the most viable, and the entire subject of mimicry in corvid vocalizations would profit from systematic study.

I am very grateful to Fred E. Lohrer for useful comments and key references.

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Florida Field Naturalist 18(4): 82-83, 1990.

Florida Scrub Jay Mortality on Roadsides

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Brevard County, Florida supports two of the three largest remaining Florida Scrub Jay (*Aphelocoma coerulescens coerulescens*) populations, with about 1,870 birds on Kennedy Space Center and 920 birds on Cape Canaveral Air Force Station (Breininger 1989). Between 24 May and 5 June 1989, four Scrub Jay carcasses were collected on two roadsides in Brevard County, apparently killed by vehicles. Two were found at the same location on 24 and 30 May at a bend in the road where the nearest scrub was about 11 m from the edge of the road. The individual found on 1 June was located on a straight section of the road where the nearest scrub was about 22 m from the edge of the road. The fourth, a brown-headed juvenile, was found on 5 June, on an intersecting road, where the nearest

scrub was about 16 m from the road edge. All of the roads are two lane, paved with asphalt, lack shoulders and have grass adjacent to the edge of the road. These roads are heavily traveled during the periods 0600 to 0800 hrs and 1500 to 1700 hrs on weekdays with moderate to light traffic during other times. Another juvenile was collected the previous year on 20 June on a two-lane dirt road where the nearest scrub was about 4 m from the road edge.

Areas of scrub oaks with sandy openings are preferred Florida Scrub Jay habitat (Westcott 1970, Woolfenden 1973, Breininger 1981), but scrub often lacks openings (Westcott 1970, Cox 1984, Schmalzer and Hinkle 1987, Breininger et al. 1988). Roadsides provide attractive habitat for Scrub Jays to hunt insects and cache acorns (Breininger and Smith, pers. obs.). Individual territories sometimes will include both sides of roads (Breininger and Smith, unpub. data), so that territorial disputes between neighboring families occur across roads. Researchers at Archbold Biological Station (ABS) regularly find and receive jays hit by vehicles on paved roads near the station (R. Mumme, G. Woolfenden, pers. comm.). Mortality exceeded reproduction in territories located along a road at ABS, suggesting that Florida Scrub Jays can not maintain stable populations where there is high speed traffic (Woolfenden and Fitzpatrick, in press). Mortality may be related to habitat characteristics, including the width of road shoulders or height of the adjacent vegetation. Data on habitat features are needed to develop strategies to mitigate the problem throughout the range of the Florida Scrub Jay. Road mortality can be significant for small populations where it may contribute to the extirpation of small local populations (Cox 1984).

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Florida Field Naturalist 18(4): 84-87, 1990.

Melanistic Bobcats in Florida

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Melanism in bobcats (*Lynx rufus*) has been documented only in Florida. Paradiso (1973) listed five records, four of which were previously reported by Hamilton (1941) and Ulmer (1941). In an annotated literature review Anderson (1987) listed only Ulmer (1941) as a reference to this phenomenon. Inasmuch as original references are scattered and additional specimens have been obtained since 1971, a summary of melanistic bobcats in Florida is needed.

The 10 known occurrences of melanistic bobcats in Florida are chronologically listed in Table 1 with corresponding locations depicted in Fig. 1. Due to the varying detail of location descriptions the mapped localities should be viewed as approximate. Ulmer's (1941) bobcats came from " . . . fourteen miles above the mouth of the Loxahatchee River . . . ", and " . . . about 2 miles above . . . the first specimen . . . and close to the point where Kitchen Creek joins the Loxahatchee." Hamilton (1941) referred to a pair trapped "between Clewiston and Belle Glade". Paradiso reported a black bobcat trapped "in the town of Loughman" (near the intersection of Interstate 4 and U.S. 27).

Five melanistic bobcats have been documented since 1971. The remains of a badly decomposed melanistic bobcat in the former Fisheating Creek Wildlife Management Area were collected in 1983 (Table 1, Fig. 1), and deposited in the collection of the Florida Museum of Natural History. A road-killed melanistic bobcat was collected in 1984 on U.S. 27, 8 miles north of the Dade-Broward County line. This specimen has been mounted for use as an instructional tool by the Game and Fresh Water Fish Commission (GFC). In 1985, a road-killed melanistic bobcat was found at the intersection of Interstate 75 and U.S. 27. Another road-killed melanistic bobcat was collected in 1986 at the 34-mile marker on the Florida Turnpike in Dade County. The most recent record of a black bobcat was an

Table 1. Records of melanistic bobcats in Florida, 1939-1990.

Record no.[1]	Month	Year	County	Sex	Reference
1	April	1939	Martin	M	Ulmer 1941
2	January	1940	Martin	F	Ulmer 1941
3	February	1940	Palm Beach	M	Hamilton 1941
4	February	1940	Palm Beach	F	Hamilton 1941
5	October	1970	Polk	F	Paradiso 1973
6[3]	November	1983	Glades	M	Roof, J.[2]
7	November	1984	Broward	F	Carlson, K.[2]
8	December	1985	Broward	F	Eddie, G.[2]
9	May	1986	Dade	M	Kelley, D.[2]
10	April	1990	Polk	M	Laing, S.[2]

[1]Numbers correspond to locations on Fig. 1.
[2]Collected by Game and Fresh Water Fish Commission personnel.
[3]Florida Museum of Natural History catalog # 24023.

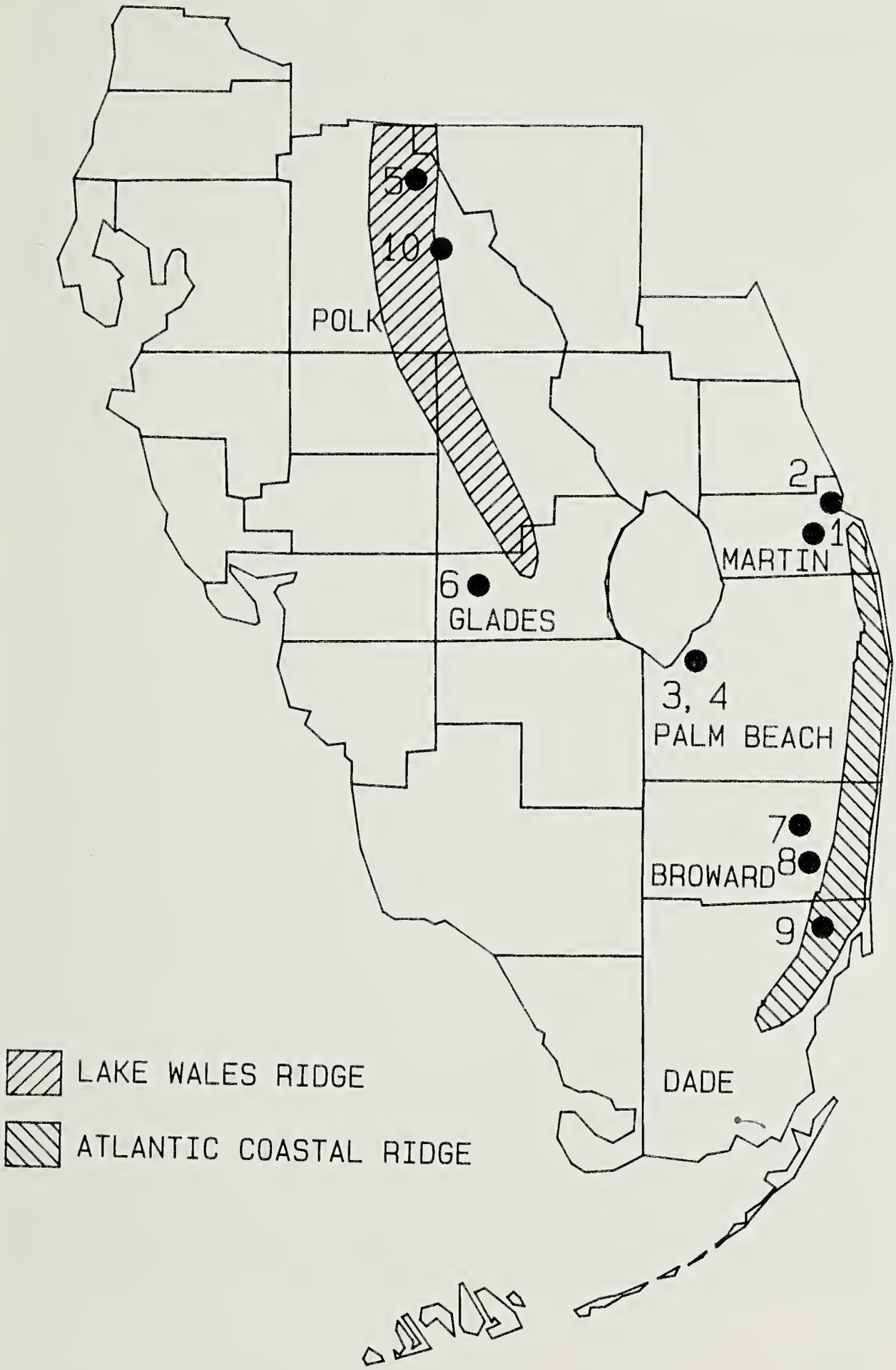

Figure 1. Distribution of black bobcats in Florida, 1939-1990.

Figure 2. A melanistic bobcat captured in Polk County, April 1990 (photo by Steve Laing).

animal accidentally captured in a trap set for raccoons (*Procyon lotor*) in April 1990 by a local resident near Tiger Lake in Polk County, about 3 km north of State Road 60 (Fig. 2). The animal was relocated about 22 km south of its capture site (Laing 1990).

All of the melanistic bobcats known from Florida have been collected, or trapped in southern peninsular Florida. Locations 5, 6 and 10 are located along the Lake Wales Ridge, whereas 1, 2, 7, 8 and 9 parallel the Atlantic Coastal Ridge. Locations 3 and 4 appear to be exceptions but are mid-distant (50 km) between both ridges. Although these ridges are prominent physiographic features in south Florida, they have little, if any, influence on the occurrence of melanistic bobcats. A more likely influence is the occurrence of dark, poorly-drained soils associated with wetlands (e.g. bay swamp, sawgrass marsh) adjacent to scrub ridges. A number of mammal species such as marsh rabbits (*Sylvilagus aquaticus*) exhibit darker forms in less-elevated areas of Florida (Blair 1936).

Numerous casual observations of free-ranging dark cats have been reported throughout Florida, however, specimens or photographs of melanistic bobcats are lacking except for those reported here. Discussions with fur dealers revealed that no black bobcats have been reported in northern Florida counties (P. Crews, Glen St. Mary, pers. comm.; C. Wood, Steinhatchee, pers. comm.). Further, intensive field work associated with panther (*Felis concolor coryi*) and bobcat research in Hendry, Collier and south Dade counties has not produced a black bobcat specimen despite numerous (>200) observations and captures of bobcats in this area (R. McBride, GFC, pers. comm.). Melanism in bobcats may be even more unusual or absent outside of southern peninsular Florida.

We thank GFC employees J. Roof, K. Carlson, G. Eddie, D. Kelley and S. Laing for sharing information concerning recent records of black bobcats. P. Crews, C. Wood, and R. McBride graciously shared their knowledge and extensive experiences with trapped and captured bobcats in Florida. S. Laing, S. Shea, B. Gruver, R. Belden, and J. Layne made helpful comments on earlier drafts of the manuscript.

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A Record of the European Turtle-Dove in the Florida Keys

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On 9 April 1990, Wells (Hereafter PW) observed a strange dove at the Lignum Vitae State Botanical Site's private access point on Lower Matecumbe Key. On 10 April, he described it to Hoffman (hereafter WH) as most resembling the Spotted Dove (*Streptopelia chinensis*) as illustrated in the National Geographic Society Field Guide to the Birds of North America (National Geographic Society 1983) but differing in several respects. It was present all day on 10 April. WH and Richard Sawicki of National Audubon Society observed and photographed it shortly after noon and WH photographed it again at 1800 hrs (Fig. 1). The bird was observed at leisure at distances of as little as 10 m as it fed on a mowed lawn and bare ground with Mourning Doves (*Zenaida macroura*) and Common Ground-Doves (*Columbina passerina*). Using Goodwin (1983) and Cramp et al. (1985), WH identified the dove as a European Turtle-Dove (*Streptopelia turtur*) in bright and unworn adult plumage (the British literature calls *S. turtur* the Turtle Dove, but that English name is inadequate because there are at least five species called turtle doves worldwide). On 11 April, the bird was seen by Smith (hereafter PWS), Sue Smith and Mickey Wheeler and examined carefully with a Questar telescope as it sat in a Gumbo Limbo (*Bursera simaruba*) tree. Despite regular subsequent searches by PW and WH, the bird was not seen again.

European Turtle Doves have several close relatives in Africa and Asia [Dusky Turtle-Dove (*S. lugens*); Pink-bellied Turtle-Dove (*S. hypopyrrha*); Eastern or Rufous Turtle-Dove (*S. orientalis*); and Laughing Dove (*S. senegalensis*)], but *turtur* can be distinguished by details of back and wing color, grey crown color, pinkish breast color, and/or tail pattern, and especially by the black neck-patches prominently hatched with silvery white. *Streptopelia* also includes the Spotted Dove or Lace-necked Dove (*S. chinensis*) and a group of species with solid black half-collars on the backs of their necks. The latter group includes the Ringed Turtle-Dove (*S. risoria*) and the Eurasian Collared-Dove (*S. decaocto*), both established exotics in Florida. The European Turtle-Dove breeds throughout temperate western and central Europe, and locally in north Africa. Most of the population migrates to sub-Saharan Africa to winter (Cramp et al. 1985).

The occurrence of this bird in south Florida is not easy to explain. We consider three possibilities: the bird escaped from captivity or was deliberately released; the bird crossed the Atlantic on its own from its natural range; or the bird crossed the Atlantic assisted by one or more rides on board ship.

Because pigeons and doves are popular cage birds, any exotic columbids appearing in Florida (other than some Caribbean species) should be under strong suspicion as escapes from captivity. European Turtle-Doves are quite rare in captivity in the United States, however (American Dove Association 1986 directory), and none have entered legally through the Port of Miami in at least five years (USDA data, C. Miles, pers. comm.). The possibility of escape from captivity in the West Indies is also possible; after all, this is the route Eurasian Collared-Doves took to reach Florida (Smith 1987). The European Turtle-Dove's highly migratory habits apparently make it less suitable as a cage bird than the Ringed Turtle-Dove or the Spotted Dove. PWS was able to examine the plumage and feet of the dove on Lower Matecumbe Key through a Questar telescope. Except for a couple

of wing-coverts, the bird showed none of the feather wear common on captive birds. The tips of the tail and primary feathers were clean and undamaged. All claws were examined and showed no signs of abrasion or unusual wear. From this inspection we conclude that if the bird were captive, it likely was held only briefly and almost certainly had been free long enough to molt its entire plumage.

Several lines of evidence point to the possibililty of a European Turtle-Dove making its way naturally to Florida. The species is highly migratory, and the distance from West African wintering areas (e.g. Senegal) to south Florida (ca. 6400 km, or 4000 miles) is not a lot farther than the distance from those same wintering areas to the species' northern limits in Europe (5500 km or 3400 miles). The appearance of this bird in mid-April coincides with the peak of migratory movement out of Africa (Cramp et al. 1985). The birds migrate across the Mediterranean Sea and Bay of Biscay, and often appear in the Azores and Canary Islands, so they are able to cross water. They migrate across the Sahara Desert as well and apparently are capable of fairly long nonstop flights. A European Turtle-Dove flying from Africa to south Florida would not have to cover the whole distance nonstop, but could have rested in the Lesser or Greater Antilles or even on the eastern South American mainland. March 1990 was particularly windy in south Florida, with the weather dominated by southeasterly trade winds, so favorable wind conditions for an Atlantic crossing did occur. Vagrancy of spring migrants westward across the Atlantic from west Africa to the Caribbean and southeastern United States has not been noticed in the past [although such a pattern of vagrancy from Africa northwest to New England and the maritime

Figure 1. European Turtle-Dove on Lower Matecumbe Key, Monroe County, Florida, 10 April 1990.

provinces of Canada has been suggested, e.g., Grove et al. (1981) for Common Cuckoo (*Cuculus canorus*); and McLaren (1989) for Little Egrets (*Egretta garzetta*)]. European species that winter in Africa, particularly herons and shorebirds, do seem to stray southwestward across the Atlantic to the West Indies in fall; a fall record of Common Cuckoo exists for Barbados (Bond 1959). A European Turtle-Dove possibly could have arrived in the western hemisphere in the autumn, wintered in the West Indies or South America, and then migrated north into Florida at the same time its compatriots were leaving Africa for Europe.

The third possibility is that the bird reached the western hemisphere across the Atlantic, but was assisted by a ride on a ship. The best information on land bird occurrences at sea comes from the *Sea Swallow*, the journal of the Royal Naval Birdwatching Society. This journal each year summarizes observations submitted by its members of land birds coming aboard ship, or observed at sea, throughout the world. We perused these summaries in volumes 29 through 37 (1977 through 1987). In all years, European Turtle-Doves were reported seen at sea in the eastern Atlantic, in the Mediterranean, in the Red Sea and/or in the western Indian Ocean, during both spring and fall migration. They were among the species most consistently reported landing aboard ships. One notable occurrence (*Sea Swallow* 30: 79, 1981) was of a European Turtle-Dove that came aboard a ship northwest of Scotland 11 May 1980, rode it south (!) for eight days and 4800 km (3000 miles), and left the ship off the Azores. Given the abundance of ship traffic across the Atlantic, from Africa and Europe to North America, South America, the Panama Canal, and the West Indies, it is perhaps surprising that records of European Turtle-Doves hitchhiking to the New World have not surfaced before.

We would suggest that ship-assisted vagrancy is the most credible explanation for this European Turtle-Dove's appearance, although unassisted vagrancy and escape from captivity are both plausible. Escaped doves, particularly of the genus *Streptopelia*, are adept at establishing breeding populations (Smith 1987), so if this bird did come from a large release or escape, establishment of a feral population is a real possibility. However, to our knowledge, there have been no other reports of this species at large in Florida or elsewhere in the United States.

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FIELD OBSERVATIONS

Prepared by the Field Observations Committee

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The sightings reported here are largely unsubstantiated field observations that have not been reviewed by the FOS Records Committee. As such, the observations should be considered tentative pending a more formal review. We encourage observers to submit appropriate records to the Records Committee c/o Jocie Baker (Secretary), 851 N. Surf Road., #302, Hollywood, FL 33019.

Several conventions have been adopted to save space, A 3-character set of alpha-numeric initials is used to identify contributors within the accounts of individual species. A complete list of observers and corresponding initials is provided at the end. The list of observers is organized alpha-numerically using the 3-character initials. Names of observers for this report are drawn from a master list, and this procedure may result in occasional gaps in the alpha-numeric sequence (e.g., the listing of LA2 without a previous LA1).

Another convention adopted is the use of common names exclusively. Persons interested in scientific names should consult A.O.U. (1983. Checklist of the North American Birds, 6th ed. Lawrence, Kansas: Allen Press, Inc.) and revisions as published in the *Auk*. Other uncommon abbreviations used occasionally are: BBS, breeding bird survey; CBC, Christmas Bird Count; m. obs., many observers; NP, national park; NWR, national wildlife refuge; SP, state park; and SRA, state recreation area. Unless necessary, the counties of named locations are omitted.

The Field Observations Committee would like to thank everyone who contributed to this column. Please bring any unreported sightings to our attention by writing to Jim Cox, compiler.

Spring Report: March-May 1990

Drought conditions continued to dominate much of the birding activity this Spring. Low numbers of nests and many nest failures characterized wading bird colonies throughout the southern portion of the state. A major storm on 8-9 Apr brought some relief, and many species initiated nesting soon afterwards, but nesting was much later than normal. A few observers reported an influx of wading birds into central and north Florida, including some unusual extra-range reports of white morphs of Great Blue Herons.

Late reports for a variety of ducks trickled in, mostly notably from the central Florida area and the northwest. Some interesting observations of waterfowl were made well into May. There were few spectacular migrant fallouts along the lower east coast, though most of the usual migrants appeared in small numbers. Fallouts in north Florida were noted in late April and on into mid-May in some areas. These later fallouts produced some very interesting birds, but most observers reported smaller concentrations than usual. South Florida felt the edges of the first tropical depression (unnamed) over Memorial Day weekend, but there was no unusual sightings associated with this storm system

Field Observations

RED-THROATED LOON: 1 at Gulf Breeze (Santa Rosa Co.) on 18 Mar; observed at length (PT1, BT1, SD1, m. obs.).

PACIFIC LOON: 1 at St. George Island Causeway (Franklin Co.) on 22 Mar (JC1); 1 at Pensacola on 6 May (same bird?) in breeding plumage (DF2, AF1); if accepted, 2nd and 3rd state records.

LEAST GREBE: 2nd state record near Marco Island (Lee Co.) on 3 Mar (JD1, LD1); present at least through 28 Apr.

WILSON'S STORM-PETREL: this pelagic species observed twice *inside* barrier islands; 1 near Key Biscayne (Dade Co.) on 5 May (VE1); another in Snake Bright Channel (Dade Co.) on 14 May (DL3).

BROWN PELICAN: adults and immatures at scattered locations in Polk Co. from 13-27 May (BB3, BC2, LC2); unusual inland records.

WHITE-TAILED TROPICBIRD: 1 near Key West (Atlantic side) on 19 Apr (TO1).

GREAT CORMORANT: 1 on Indian River near Titusville (Brevard Co.) on 3 Apr (HY1).

ANHINGA: single nest initiated at Anhinga Trail, Everglades NP, but it failed (JB1, ER1).

FRIGATEBIRD: 1 at Eastpoint (Franklin Co.) on 26 Apr (JS3); uncommon along Big Bend coast.

LEAST BITTERN: pair courting at Key West on Apr 4, also on Apr 30 (JO1); unusual for the area.

AMERICAN BITTERN: 1 at Merritt Island NWR (DC3, PS1) on 3 Apr; late record for area (breeding?).

COLONIAL WADERS: despite the drought, successful breeding reports filtered in from south Florida; a SE Hendry County rookery had nests of 10 Little Blue Herons and 10 Tricolored Herons and 100+ nests with young Cattle Egrets on 20 May (JB1, ER1); 2 rookeries along New River Canal (Broward Co.) had Tricolored Heron nests with young on 17 May (JB1, ER1); Wood Storks at Corkscrew Sanctuary were ca. 15 days from fledging by 30 May (park journal).

GREAT BLUE HERON, WHITE MORPH: 1 at Phipps Point (Franklin Co.) in early May (GS1) and 1 at Ft. Meade (Polk Co.) on 3 Mar (LC2) were north of normal range; another inland record at "The Gap" (SW Broward Co.) on 24 May (JB1, GM1).

REDDISH EGRET: dark-phase immature far island at Nine Mile Pond, Everglades NP, on 9 and 15 Apr (BN2, JS2, RS1).

ROSEATE SPOONBILL: 2 remained inland at phosphate mines (Polk Co.) through period (m. obs.); impressive group of 50-60 at Eco Pond, Everglades NP, on 15 Apr (BN2, LA2); 30 at Merritt Island NWR (Brevard Co.) on 19 Mar (KD1, BF1).

CANADA GOOSE: 1 at Navarre (Santa Rosa Co.) on 25 Apr (CT1) was late.

FULVOUS WHISTLING-DUCK: various reports of 1-11 at St. Marks NWR (Wakulla Co.) from 1-30 Apr (JG2, DB3, DE1); also near Pensacola on 9 May (DF2, AF1); uncommon for both areas.

WOOD DUCK: 2 pairs investigating nest holes at Deering Estate (Dade Co.) despite a lack of freshwater in the area (VE1); 1 at New River Canal (Dade Co.) on 17 May (JB1, GM1); uncommon for both areas.

GREEN-WINGED TEAL: 1 at phosphate mines (Polk Co.) on 5 May (PF1, DF1) was late for area.

WHITE-CHEEKED PINTAIL: 1 at Merritt Island NWR (Brevard Co.) on 30 Mar (HR1); seen through 8 Apr (m. obs.).

BLUE-WINGED TEAL: 5 at Key West on 23 Apr (JO1) were late.

RING-NECKED DUCK: 5 stragglers at phosphate mines (Polk Co.) on 22 May (CF1, DF1); usually only isolated individuals/pairs are seen this late.

OLDSQUAW: 1 in Santa Rosa Co. on 20 May (BM1); late record for area.

WHITE-WINGED SCOTER: female at Banana River (Brevard Co.) on 28 Apr (DC4, KB1, JD2, NP1) was late.

HOODED MERGANSER: 3 nests in "wood duck" boxes in north Florida (DC1); 1 each from Ocean Pond (Baker Co.), Swift Creek Pond (Union Co.), and Palestine Lake (Union Co.).

COMMON MERGANSER: 1 near St. James (Franklin Co.) on 21 Apr (DM1, HS1); unusual and late.

RED-BREASTED MERGANSER: 6 stragglers in Lee Co. on 10 May (VM1); late female off Elliott Key (Dade Co.) on 20 May (VE1).

RUDDY DUCK: 7 late birds at phosphate mines (Polk Co.) on 22 May (CF1, DF1).

SWALLOW-TAILED KITE: 22+ at "The Gap" (SW Broward Co.) on 24 May (JB1, GM1), good spring concentration; several observed drinking on the wing (like swallows) at Nine Mile Pond, Everglades NP, on 15 Apr (BN2); 1 over Merritt Island NWR (Brevard Co.) (SM1) on 2 Apr was unusual.

MISSISSIPPI KITE: 1 foraging in Key West (JO1) on 9 May represents a rare event.

BLACK-SHOULDERED KITE: nest in Everglades NP close to fledging by June (fide OB1); nests in the Holey Land WMA (Broward Co.) failed (fide WG1).

SNAIL KITE: 11 (!) in 2 Australian pines east of Conservation Area 3A (Broward Co.; JB1).

COOPER'S HAWK: 2 nests at Archbold Biological Station (Highlands Co.); 1 in a bayhead (MM1).

RED-TAILED HAWK: 1 black phase seen over the Suwannee River (Dixie Co.) on 17 Mar (JC3, KN1).

SHORT-TAILED HAWK: late migrant photographed near Key West on 20 Apr (TO1); other migrant/breeding reports include 1 at Highland Hammocks SP on 16 Mar (BK1, MK1), light-phase bird near West Lake, Everglades NP, on 15 Apr (BN2, JS2, RS1), and 1 at St. Marks NWR (Wakulla Co.) on 26 Apr (very rare; JC1); a pair regularly at Tiger Creek Preserve (Polk Co.; BC2, m. obs.); courtship observed along Arbuckle Road (between Polk and Highlands cos.) on 29 Apr (RW1); 1 at Archbold Biological Station (Highlands Co.) on 12 May (JF2).

MERLIN: 1 at Merritt Island NWR on 16 May was late (DS2, MH3); several reports in early-mid Apr from Big Bend area (JC3, DM1).

PEREGRINE FALCON: 7 (!) passed Cruickshank Tower at Merritt Island NWR (Brevard Co.) on 20 Apr (m. obs.).

YELLOW RAIL: 1 at St. Marks NWR (Wakulla Co.) on 10 Apr (DE1, EW1) was "almost stepped on" by observers.

VIRGINIA RAIL: unknown number in marshes around Ft. Myers Beach on 30 Apr (VM1).

KING RAIL: 1 at St. Andrews Bay SP (Bay Co.) on 3 May (DM1); locally rare.

SORA: 1 at Ft. Walton Beach on 31 May (DW1, CW1) was very late.

SANDHILL CRANE: 1 at Indian Pass (Gulf Co.) on 4 May (SJ3) and 2 near Tallahassee (Leon Co.) on 13 May (JC1) were unusual; a few pairs in Taylor Co. on 19 May (JC3, KN1).

SEMIPALMATED PLOVER: extremely high inland count of 142 (PF1, DF1) at phosphate mines (Polk Co.) on 5 May; 50 at Shell Island (Bay Co.) on 4 May (DM1).

PIPING PLOVER: 42 (!) at Phipps Preserve (Franklin Co.) on 15 Apr (DM1); potentially important staging area.

BLACK-BELLIED PLOVER: 60-75 at Lanark Island (Franklin Co.) from 14-22 Apr (DM1).

BLACK-NECKED STILT: several reports from panhandle this spring: 2 at St. Marks NWR (Wakulla Co.) on 28 Apr (CG2); 1 south of Tallahassee on 11 May (JC1, DM1); 1-2 birds present at 4 places in west Florida (RD1, m. obs.).

AMERICAN AVOCET: 20 in breeding plumage at Ft. Myers Beach on 16 Apr (VM1).

SPOTTED SANDPIPER: high count of approximately 100 at Ocean Pond (Baker Co.) on 16 May (DC1).

UPLAND SANDPIPER: 1 at Key West on 9 May (JO1); the only report we received.

RED KNOT: 2 "tangles" of 500+ at Fort Myers Beach on 16 Apr (VM1) and at Lanark Island (Franklin Co.) on 26 Apr (DM1).

WHITE-RUMPED SANDPIPER: 2 at phosphate mines (Polk Co.) on 5 May (PF1, DF1); 1 near Tallahassee on 28 Apr and another on 11 May (DM1).

DUNLIN: 1200 at Lanark Island (Franklin Co.) on 14 Apr (DM1); good concentration.

STILT SANDPIPER: 2 in breeding plumage at St. Marks NWR (Wakulla Co.) on 8 May (JC1, HH1); high count of 622 at phosphate mines (Polk Co.) on 5 May (PF1, DF1).

SHORT-BILLED DOWITCHER: 1500 at Lanark Island on 14 April (DM1); good migration count.

LONG-BILLED DOWITCHER: 12 at St. Marks NWR (Wakulla Co.) on 22 Apr (DM1); uncommon.

AMERICAN WOODCOCK: hen and 4 young along Suwannee River (Dixie Co.) on 11 Mar (FJ1); other late (breeding?) records were 1 at Ft. Walton Beach on 24 May (DW1, CW1) and 1 at St. Marks NWR (Wakulla Co.) (CG2) on 31 May.

HERRING GULL: 1 at Loxahatchee NWR on 31 Mar (BN2) seemed far island.

HYBIRD GULL: white-winged gull near Pompano Beach landfill in mid-Mar (WG1) was likely a Herring X Glaucous hybrid.

LESSER BLACK-BACKED GULL: unusual adult plumage bird with all-black bill near Pompano Beach landfill on 24 May (BN2).

GULL-BILLED TERN: rare inland nests found at phosphate mines in Hillsborough (4 nests; PF1, DF1) and Polk (3 nests; DF1) Cos.; 3 nests on St. George Island Causeway (Franklin Co.; DM1).

ROSEATE TERN: 5 at Fort Taylor, Key West, on 18 May (JO1).

COMMON TERN: alternate-plumaged bird at Honeymoon Island on 21 Apr (BN2); 1 at Fort Myers Beach on 30 Apr (VM1).

BLACK SKIMMER: 395+ at inland location in Polk Co. (PF1, DF1, BC2) through report period but no nesting; 250-300 near Ft. Lauderdale on 24 May (JB1) and 500 (!) on Phipps Preserve (Franklin Co.) on 7 Apr (DM1) were also impressive concentrations.

WHITE-WINGED DOVE: 15 at Key West on 6 Apr (JO1) were a large number for the Keys; regular now at Archbold Biological Station (Highlands Co.) but no nests located (GW1, JF2); 1 at Panama City Beach (Bay Co.) on 23 Apr (TM1).

BLUE-FOOTED PARROT: pair investigated a nest hole at Deering Estate that interested Wood Ducks as well on Apr 25 (VE1).

WHIP-POOR-WILL: seemed especially vocal before heading back north; several reports from north Florida (PP1, JC3).

BELTED KINGFISHER: 1 straggler flew ahead of a boat for miles along Miami Canal on 16 May (JB1, GM1); 1 north of Key Largo (mile marker 108) on 19 May (JO1); 2 stragglers at phosphate mines on 22 May (Polk Co.; CF1, DF1).

RED-COCKADED WOODPECKER: 1 unconfirmed report from Corkscrew Swamp Sanctuary (sightings book, no date); first recent record for sanctuary.

EASTERN PHOEBE: second Florida nest found at Shark Valley in mid-Apr (*fide* JR2); 1 bird observed in Jackson Co. in late May (DR1).

SAY'S PHOEBE: 1 near Niceville on 22 May (JM1); observed at close range, good description provided.

LEAST FLYCATCHER: 1 at Ft. Pickens (Escambia Co.) on 9 May (RD1), second May record for area; 1 at Key West on 24 May (based on plumage, no vocalization; DM1).

BROWN-CRESTED FLYCATCHER: 1 at Cape Florida on 19 May in full song (DL2, CS1).

KINGBIRDS: 3 species (Western, Eastern, Gray) observed in a single tree in NW Broward Co. on 2 May (GM1, JB1).

GRAY KINGBIRD: 1 in the Green Swamp (Polk Co.) on 28 Apr (PF1, m. obs.), extremely rare inland; first record for county.

SCISSOR-TAILED FLYCATCHER: 1 at St. Marks NWR (Wakulla Co.) on 24 Mar (MB1).

UNKNOWN SWALLOW: bird with extensive white flanks seen in Broward Co. on 29 Apr (VM1); Violet-green Swallow?

BAHAMA SWALLOW: returned to Cutler Ridge (Dade Co.) by 19 Mar (PS1), present through end of May.

CLIFF SWALLOW: 1 at St. Marks NWR (Wakulla Co.) on 12 May (DM1); uncommon.

CAROLINA CHICKADEE: 2 at Merritt Island NWR (Brevard Co.) on 16 Apr (DS2); few records for area.

CAROLINA WREN: multiple sightings of 1 at Corkscrew Swamp Sanctuary with pure white tail and much white around the neck and folded wing.

BLUE-GRAY GNATCATCHER: 6-8 spread wings over the treated lumber of a repaired boardwalk at Corkscrew Swamp Sanctuary; birds may use chemicals in wood for "anting."

VEERY: 1 at Key West on 31 May (JO1) was very late.

HERMIT THRUSH: 1 at Storter Park (Collier Co.) on 5 Mar (MW1), and later on 17 Mar (BN2, JG1), was rare for south Florida; 2 more at Everglades NP on 28 Mar (VE1); heard singing in many areas of north Florida before leaving (JC3).

AMERICAN ROBIN: 1 at The Plantation (Lee Co.) on 13 Apr (VM1) was late; several possible breeding records include 1 at Gulf Breeze on 22 May (RD1), 1 singing at Osceola NF on 30 May (DC1), and 1 near Raiford (Union Co.) on 26 May (PP1); this last observation is further south than other known nesting sites for area.

BAHAMA MOCKINGBIRD: 1 (good documentation) at Cape Florida (PS1, m. obs.) on 20 May but not seen afterwards; *another* (same bird?) in Ft. Lauderdale (BE1) on 21 May.

CEDAR WAXWING: continued reports of large flocks from south Florida through Apr.

THICK-BILLED VIREO: 1 at Hypoluxo Island (Palm Beach Co.) on 10 Mar (HL1) remained approx. 3 weeks; it was netted, measured, videotaped, audiotaped, and photographed by several observers.

BLACK-WHISKERED VIREO: 1 at Castellow Hammock on 9 Apr (BN2, JS2, RS1) was unusually far inland.

GOLDEN-WINGED WARBLER: male at the Deering Estate (Dade Co.) on 25 Apr (VE1); uncommon southeast coast sighting.

NASHVILLE WARBLER: 1 at Cape Florida (JG1) on 13 Apr; 1 at Key West (JO1) on 12 May; rare in spring in south Florida; 1 at Gulf Island NS (Escambia Co.) on 30 Apr (HE1).

BLACKPOLL WARBLER: 1 at Long Key (Monroe Co.) on 24 May (DM1) was somewhat late.

BAY-BREASTED WARBLER: 1 at Alligator Point on 28 Apr (HS1, CW2); unusual in spring in north Florida.

AMERICAN REDSTART: late female at Long Key (DM1) on 24 May.

SWINSON'S WARBLER: late migrant at Key West on 12 May (JO1). Several breeding reports from north-central Florida lead to speculation about 1990 being a banner year for this species (at least for singing males): 5 males along Chipola River (Jackson Co.) in mid May (DM1); found in 3 atlas blocks in Taylor Co. (DM2, JC3), 1 with 7 males; 1 near Ebro (Washington Co.) on 26 May (JC3); found in 3 atlas blocks in Okaloosa Co. (DW1); found in 8 atlas blocks in Liberty Co. (m. obs.); found in 2 atlas blocks near Tallahassee (SJ2, BM2).

LOUISIANA WATERTHRUSH: apparently more common as a migrant this spring; many reports from south Florida.

KENTUCKY WARBLER: 1 at Deering Estate on 19 Apr (VE1); rare along southeast coast.

CANADA WARBLER: 1 very late at Gulf Breeze (Santa Rosa Co.) on 16 May (DB1).

CONNECTICUT WARBLER: several records for this seldom seen species: 3-4 at Cape Florida on 11 May (JB1, ER1); approximately 20 (!) at St. George Island on 15 May (JC1, m. obs.); female near Shired Island (Dixie Co.) on 17 May (JC3).

PAINTED BUNTING: sub-adult male at Key West on 25 Apr (JO1), last report for area; 1 at St. Marks NWR (Wakulla Co.) on 21 Apr (CG2), rare for area.

DICKCISSEL: 1 at Castellow Hammock ca. 17 Apr (PS1).

YELLOW-FACED GRASSQUIT: female at Flamingo, Everglades NP, on 28 Mar (DH1).

FIELD SPARROW: 1 at Eco Pond, Everglades NP, from 19-21 Mar, (RC1; Everglades NP sightings book) was unusually far south for its normal wintering range.

GRASSHOPPER SPARROW: 1 in mangroves with warblers on 21-22 Apr (VM1), was out of its element; 1 near Mullet Key (Monroe Co.) on 22 Apr (JB3, BN2, m. obs.).

LE CONTE'S SPARROW: juvenile bird in Lee Co. on 15 Apr (VM1).

LINCOLN'S SPARROW: 1 at Cape Florida on 4 May (DL2, KS1).

LARK SPARROW: 1 at St. George Island (Franklin Co.) on 26 Apr (JS3).

BOBOLINK: 1 early near Jacksonville (JC2) on 2 Apr; late reports on 24 May from Long Key (1 ad. fem., 2 imm.) and Key West (2 fem) (DM1). Notable high counts: 80 at Merritt Island NWR (Brevard Co.) on 2 May (DC3); 40 near Fort Myers on 6 May (VM1); 10 at Key West from 25-26 May (JO1).

SHINY COWBIRD: new records from north Florida indicate that the species is expanding quickly along the west coast: 1 at St. Andrews SP (Bay Co.) on 3-4 May (DM1); 1 at Ft. Pickens (Escambia Co.) on 9 May (RD1); male at Ochlockonee River SP (Wakulla Co.) on 23 May (RW1); 1 near Tallahassee on 30 May-9 June with 15 seen on 30 May (RW1); also expanding in the south with new records for Lee Co. from 5 May on (VM1). Where is this bird found along the Atlantic Coast, and why did it bypass Tampa?

ORCHARD ORIOLE: 13 at Key West on 6 Apr (JO1) represent a large number for area; male at Castellow Hammock following a storm on 9 Apr (BN2, JS2, RS1) was a rare southeast coastal record.

NORTHERN (BALTIMORE) ORIOLE: adult male and first-year male at Castellow Hammock (Dade Co.) on 9 Apr (BN2, JS2, RS1); 5 at feeder (PF1) 31 Mar-5 Apr in Winter Haven (Polk Co.).

PINE SISKIN: 1 at Merritt Island NWR on 18 Apr and 1 at feeder in Brevard Co. on 29 Apr (DC3) were late.

HOUSE FINCH: male singing in Pensacola on 23 May (RD1); first indications of possible breeding in area; reports of breeding in new areas of Leon Co. (TE1).

Observer abbreviations: Larry Axelrod (LA2), Benny Bindschadler (BB3), Dick Ballman (DB1), Dana Bryan (DB3), Jocie Baker (JB1), Joe Barros (JB3), Ken Bennet (KB1), Michael Brothers (MB1), Oron Bass (OB1), Buck Cooper (BC2), Dick Couch (DC1), Dwight Cooley (DC3), Dan Click (DC4), Jim Cavanagh (JC1), Julie Cocke (JC2), Jim Cox (JC3), Linda Cooper (LC2), R. Crooms (RC1), John Douglas (JD1), Judy Dryja (JD2), Kay Davis (KD1), Linda Douglas (LD1), Robert Duncan (RD1), Scot Duncan (SD1), Bernie English (BE1), Dave Eslinger (DE1), Howard Evecyn (HE1), Todd Engstrom (TE1), Virginia Edens (VE1), Ann Forster (AF1), Bebe Fitzgerald (BF1), Clarice Ford (CF1), Don Ford (DF1), Don Forester (DF2), John Fitzpatrick (JF2) Paul Fellers (PF1), C. S. Gidden (CG2), Jeff Goodwin (JG1), Jay Gould (JG2), J. Greenberg (JG3), Wally George (WG1), David Hartman (DH1), Hugh Hill (HH1), Mary Harrell (MH3), Fran James (FJ1), Steve Jones (SJ2), Sally Jue (SJ3), Bruce Kittredge (BK1), Marion Kittredge (MK1), Donn LeRoy (DL1), David Lysinger (DL2), D. Ligget (DL3), Howard Langridge (HL1), Bill Milmore (BM1), Brian Millsap (BM2), Doug McNair (DM1), Dave Mehlman (DM2), George Myers (GM1), Joyce McKenney (JM1), Michael McMillan (MM1), Steve McGehee (SM1), Tony Menart (TM1), Vincent McGrath (VM1), Bruce Neville (BN2), Katy NeSmith (KN1), Joe Ondrejko (JO1), Tim O'Day (TO1), Nancy Paul (NP1), Peggy Powell (PP1), Doug Runde (DR1), Ed Rosenberg (ER1), Harry Robbinson (HR1), Jay Robinson (JR2), Kitty Suarez (CS1), David Simpson (DS2), Greg Seamon (GS1), Henry Stevenson (HS1), John Squire (JS2), Jim Stevenson (JS3), Kevin Sarsfield (KS1), P. William Smith (PS1), Rita Squire (RS1), Charles Teagle, (CT1), Bill Tetlow (BT1), Phil Tetlow (PT1), H. G. Toung (HY1), Carol Ware (CW1), C. Watt (CW2), Donald Ware (DW1), Eddie White (EW1), Glenn Woolfenden (GW1), Mickey Wheeler (MW1), Rick West (RW1).

Florida Field Naturalist 18(4): 97-99, 1990.

IN MEMORIAM: RALPH W. SCHREIBER, 1942-1988

James J. Dinsmore
Department of Animal Ecology, Iowa State University, Ames, Iowa 50011

Ralph Schreiber, a world expert on pelicans and seabirds, died on 29 March 1988 in Los Angeles. Born in 1942, Ralph received a B.A. from the College of Wooster (Ohio) in 1964, a M.S. from the University of Maine in 1967, and the Ph.D. from the University of South Florida in 1974. From 1976 until his death, Ralph was Curator of Ornithology and section head at the Natural History Museum of Los Angeles County. In 1984, he was appointed section head for mammals as well and was responsible for the section's research exhibits, budget, and educational programs.

In fewer than 46 years, Ralph packed in a lot of living. He traveled extensively, especially in the Central Pacific Ocean. He was the author or co-author of more than 80 scientific publications as well as two books, numerous reviews, 15 popular articles, and 12 technical reports. He deservedly earned the reputation of being one of the most talented biologists working with seabirds, especially the pelicans. That is but a brief sketch of Ralph; more details are available in another tribute (Woolfenden, G. E. 1989. Auk 106: 137-139). What I would like to do here is touch on the Florida years, an important part of Ralph's career.

Ralph moved to Florida in 1969 and enrolled in a doctoral program under Glen Woolfenden at the University of South Florida. He arrived in Florida after spending three years working on various islands in the Pacific Ocean for the Pacific Ocean Biological Survey Project of the Smithsonian Institution. Although much of his work in the Pacific had involved banding seabirds, Ralph had also become familiar with the fascinating breeding and molt cycles of various seabirds as well as the problems some species encountered in obtaining adequate food for themselves and their young. These topics dominated his work for the rest of his life.

At South Florida, Ralph undertook a comprehensive study of Brown Pelicans in the Tampa Bay region. The timing was perfect as the concerns over the effects of DDT on the breeding success of some birds were reaching their peak. Louisiana (the pelican state) had lost all of their breeding Brown Pelicans and there were concerns that Florida's Brown Pelican populations would decline too. Much of Ralph's work was done at the Tarpon Key colony at the mouth of Tampa Bay. He also studied several other area colonies. Ralph didn't limit his work to the breeding season but monitored the birds year around. He studied Brown Pelican behavior, food habits, breeding biology, productivity, movements, molt, energetics, and effects of environmental toxicants, truly a huge task. In the end, he wrote up the data on pelican behavior for his dissertation which he completed in 1974. Overall, he wrote some 20 papers on Florida pelicans, most of them based on data he collected during his dissertation research. Three of these papers-a monograph on pelican behavior, a summary of pelican nesting success, and a review of pelican populations in the United States-are especially significant and established Ralph as an expert on the species.

In addition to his work on pelicans, Ralph also studied a number of other birds of the region. In 1972, the two of us (and later his wife Elizabeth Anne) began a study of Laughing Gulls along the St. Petersburg Bayway that continued for several years. He also wrote papers on frigatebirds, ducks, and terns based on his work from this period. In all, Ralph authored or co-authored about 39 scientific papers based on work in Florida, most of it done from 1969 to 1976.

Ralph was a regular member of the annual spring and summer forays to the Dry Tortugas to band Sooty Terns and Brown Noddies. Because of his previous experience with

seabirds in the Pacific Ocean, his ideas added new dimensions to evening discussions of seabird biology. Ralph also was a formidable "opponent" in the inevitable competition to see who could band the most tern chicks.

One of the most important events in Ralph's life occurred in 1972 when he married Elizabeth Anne Ferguson. Betty Anne was immediately part of the team and the two worked together for the rest of Ralph's life. They co-authored numerous papers over the next 16 years, and she is continuing the field work, analysis, and publication of their research.

Ralph was first and foremost a field biologist and was especially interested in various aspects of breeding biology including nesting success, food habits, and feeding rates of the young. Big (six feet four) and angular, he moved rapidly and efficiently as he worked through a colony. Still he was always gentle with the birds and was continually concerned about the effect that investigators or other intruders might have on the nesting success of the birds he was studying. Ralph's height, booming voice, and loud laugh made him stand out in a crowd. His congenial nature and interest in the work of others naturally drew people to him, and he always attracted attention at meetings.

Besides his research, Ralph was active in the ornithological community in Florida. He was a charter member of the Florida Ornithological Society and served as its Vice President from 1975 to 1977. He was on the Board of Directors of the Florida Audubon Society from 1975 to 1977.

My favorite memories of Ralph involve the days we worked together in the Laughing Gull colony near the St. Petersburg Bayway. At the end of several hot days, I recall sitting quietly with him near the beach and watching the sun set while the gulls returned to feed their young or to gather to roost on the beach. Back on the mainland, our comic relief was to drive into St. Petersburg, enter a restaurant in our sweat-soaked and gull barf-covered clothes, and order something cold to drink. They were good times.

The story I best remember him relating to me was how one time one side of his observation tower on Tarpon Key slowly sank in the mud and tipped over. Since he was on top of the tower at the time, he and a valuable camera ended up soaked in the salty, muddy waters of the lagoon. He laughed about it but also lamented the loss of some photographs he had taken.

Ralph was a top-notch scientist who left behind a wealth of published material that will be referred to for decades. His work on Brown Pelicans is especially important both for helping turn the tide in the decline in this species and for providing baseline data that others will use in the future. Of equal importance, he was an enjoyable person to be around and one who quickly conveyed his strong interest in birds to others. To say he will be missed seems trite, but it is true.

Ralph clowning it up after a day of banding Brown Pelicans on the Indian River near Vero Beach on Florida's east coast, 17 June 1971. From left, Ralph Schreiber, Glen Woolfenden, Janet Falk, Herb Kale, and Patricia Dolan. Photograph taken by Chet Winegarner.

EDITORIAL

Acknowledgments.—This concludes my fourth and final volume as editor of the *Florida Field Naturalist.* No tears please! I have enjoyed my duties and power as editor, but look forward to all the spare time I will now have at my disposal to write my own manuscripts for submission to the *Naturalist.* I want to thank the officers and board of the Florida Ornithological Society for making my editorship an easy one. I appreciate the assistance of the Associate Editors in producing these past four volumes. My editorship also was made easier with the support of the Florida Game and Fresh Water Fish Commission. Special thanks go to Fred Lohrer for all his advice and to Jim Cox for taking on the job as compiler for the new section on field observations.

The excellence of a scientific journal is due in large part to the quality of manuscripts that it publishes. I thank all those authors who submitted their observations and study results, especially those who submitted manuscripts in the correct style and format of the journal, and revised their papers and returned them in a reasonable time. I am reminded of a very appropriate quote by my favorite author Kurt Vonnegut Jr., "This is what I find most encouraging about the writing trades: they allow mediocre people who are patient and industrious to revise their stupidity, to edit themselves into something like intelligence." However, the hidden strength and support of a journal are the referees who read the manuscripts and make my job much easier. I again thank all the reviewers of manuscripts published in previous volumes, and now thank the following individuals who accepted the arduous, thankless, blithe, and labor-of-love task of reviewing manuscripts in this volume during the past year: M. Collopy, D. Cooley, M. Delany, J. Gore, H. Kale, H. Langridge, F. Lohrer, D. Maehr, K. Marti, B. Millsap, P. Moler, S. Nesbitt, J. Ogden, R. Paul, W. Post, D. Runde, P. Stangel, J. Stout, M. Sunquist, P. Sykes, B. Toland, and S. Winterstein.

Change of Editor.—The Florida Ornithological Society is pleased to announce the appointment of Dr. Peter Merritt as the next editor of the *Florida Field Naturalist.* All new manuscripts submitted for possible publication in the *Naturalist* should be submitted to the editor-elect: Dr. Peter G. Merritt, Editor, Florida Field Naturalist, P. O. Box 1954, Hobe Sound, Florida 33475-1954.

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INFORMATION FOR CONTRIBUTORS

The Florida Field Naturalist is a fully refereed journal emphasizing biological field studies and observations of vertebrates, especially birds, in and near Florida and the nearby West Indies. It welcomes submission of manuscripts containing new information from these areas. Please consult recent issues for style, and Vol. 18, No. 1 for detailed information. Submit manuscripts for consideration to the editor James A. Rodgers. Monograph-length manuscripts may be submitted for consideration to the Editor of Special Publications John William Hardy. Send books and other materials for review to Associate Editor Sheila A. Mahoney. Send copies of recent literature on Florida birds to Special Editor Fred E. Lohrer. For preliminary assistance regarding submission of manuscripts dealing with bird distribution and rarities contact Associate Editor Howard P. Langridge. Reports of rare birds in Florida should also be submitted to the FOS Records Committee Secretary Jocie Baker. For preliminary assistance regarding submission of scientific, technical, or behavioral contributions contact Associate Editor Richard T. Paul.

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All persons interested in Florida's natural history, particularly its abundant bird life, are invited to join the Florida Ornithological Society **by writing the Treasurer**. Annual membership dues are $15 for individual members (overseas $20), $20 for a family membership, $10 for students, and $35 for contributing members.

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URBANIZATION AND DOMESTICATION OF THE KEY DEER *(ODOCOILEUS VIRGINIANUS CLAVIUM)*

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Abstract.—Due to an explosive population increase of people, the endangered Florida Key deer (*Odocoileus virginianus clavium*) herd has rapidly become urbanized. We studied Key deer in housing subdivisions on Big Pine Key during 1989 and 1990 to identify people-associated changes in sociobiology. Maximum group sizes of Key deer were much larger in 1989-1990 than in 1968-1973. Tolerance of physical contact with humans and decrease in intraspecific interactions were evidence of domestication. Concentrations of Key deer in subdivisions were associated with level of feeding by residents. Enforcement of laws prohibiting feeding and management practices to lure deer from subdivisions are recommended.

A burgeoning human population results in an increase in human-deer interactions; hence, a better understanding of such relationships is required (Decker and Gavin 1987). Placement of preserves, parks, and refuges within and adjacent to human population centers, such as described for the greater Chicago metropolitan area (Witham and Jones 1987), requires careful and specialized wildlife management.

Big Pine Key, Monroe County, which supports 60-70% of the endangered Florida Key deer population (totaling 250-300), exhibits the fastest human population growth of the lower keys. The permanent human population increased from less than 806 in 1970 (Monroe County 1986) to 3,400 in 1988 (Sedway Cooke Associates et al. 1989). In addition, some 1,600 seasonal residents were present in 1988 (Sedway Cooke Associates et al. 1989). Excluding tourists, the island-wide density of people (roughly 2.2 people/ha) in the late 1980s was 18 times that of deer (about 0.12 deer/ha). Human-deer interactions are concentrated in housing subdivisions.

We hypothesized that through increased urbanization of their habitat, Key deer sociobiology had changed since the late 1960s and early 1970s.

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The objectives of this study were to compare Key deer sociobiology and human-deer interactions among three subdivision areas of Big Pine Key, and to compare these urban Key deer with the biology of Key deer as recorded for 1968-1973 (Hardin 1974, Silvy 1975, Hardin et al. 1976, Klimstra and Dooley 1990).

Study Area

Big Pine Key is located 170 km southwest of Miami and 48 km east-northeast of Key West, along U.S. Highway One. The island is about 13.3 km long and 3.3 km wide, with a maximum elevation of 3 m (Hardin et al. 1984). Vegetation of uplands is predominantly open pineland (*Pinus elliottii* Engelm. var. *densa* Little and Dorman, Scurlock 1987) with an understory of palms (*Thrinax morrisii* H. Wendl. and *Coccothrinax argentata* (Jacq.) L. H. Bailey, Scurlock 1987). The climate is subtropical/marine, with a mean annual temperature of 25°C and mean annual rainfall of about 97 cm (Schomer and Drew 1982).

Study areas one and two were within the Port Pine Heights subdivision at the north end of Big Pine Key (Fig. 1). These two study areas (34 and 24 ha, respectively) were analyzed separately because a steep-sided, high-walled canal presented a barrier to deer movement, resulting in relatively little interchange during the study. Undeveloped lots consisted mainly of grasses, with a few scattered trees and shrubs. The west side of Port Pine Heights was bordered by Pine Channel and the remainder of the subdivision was surrounded by lands of the National Key Deer Refuge.

Study area three consisted of 33 ha within the Eden Pines subdivision of central Big Pine Key (Fig. 1). This subdivision also was bordered by refuge lands. Predominant vegetation in vacant lots was woody, and few open grassy areas were present.

Methods

Observations of subdivision deer were conducted from July 1989 through April 1990. Study areas were monitored continuously during 112 observation periods totaling 155 hours ($\bar{X}$ obs. period = 1.4 hr, SD = 0.6). Observations were conducted during all daylight hours, with efforts concentrated at dawn and dusk. The observer toured a study area by bicycle until deer were sighted. These deer became focal individuals and were followed at distances great enough to avoid affecting their behavior. Time, location, group size, sex and age composition, movements, and general behaviors were recorded. Factors affecting deer behavior, especially human-related, were noted. Deer were video-taped to aid in identification of individuals and allow better interpretation of deer activities.

The study period covered the greater part of a complete annual cycle in the life of Key deer; for purposes of analyses, data were organized by biological season. Observations from July and August represented "postfawning," those from September through January were considered "rut," those from February and March "postrut," and observations from April "fawning." Postrut and fawning seasons were monitored only at study area two.

Maximum group size per observation period was analyzed to determine associations with study area, season, and time of day. A "group" of deer included individuals within view of each other and responding to each other, or within auditory or olfactory contact (Hardin et al. 1976). Data were analyzed using the Statistical Analysis System (SAS 1987). When analyses of variance showed significant (alpha = 0.05) differences, Duncan's Multiple Range Tests with alpha = 0.05 were used to separate means. Results were compared with Key deer group sizes recorded in 1968-1973 (Hardin et al. 1976), when people densities were low (about 0.3 people/ha) and there was minimal feeding of deer.

RESULTS

Study Area One.—Mean maximum group size during postfawning was greater than during rut (Table 1). During postfawning, a typical group consisted of three adult females, a yearling male, and a fawn that were feeding in vacant, vegetated lots of the subdivision. During rut, groups were rarely observed, but individual yearling or adult males wandered through the subdivision. There was no significant difference in maximum group size among morning, mid-day, and evening observation periods (Table 1).

Study Area Two.—Mean maximum group size during postrut was greater than for rut (Table 1). Other comparisons of means among seasons were not significantly different. A typical group during postrut consisted of one adult buck, eight adult and yearling does, and five fawns. During fawning a usual group consisted of seven adult and yearling does and five fawns. The typical postfawning group included an adult buck,

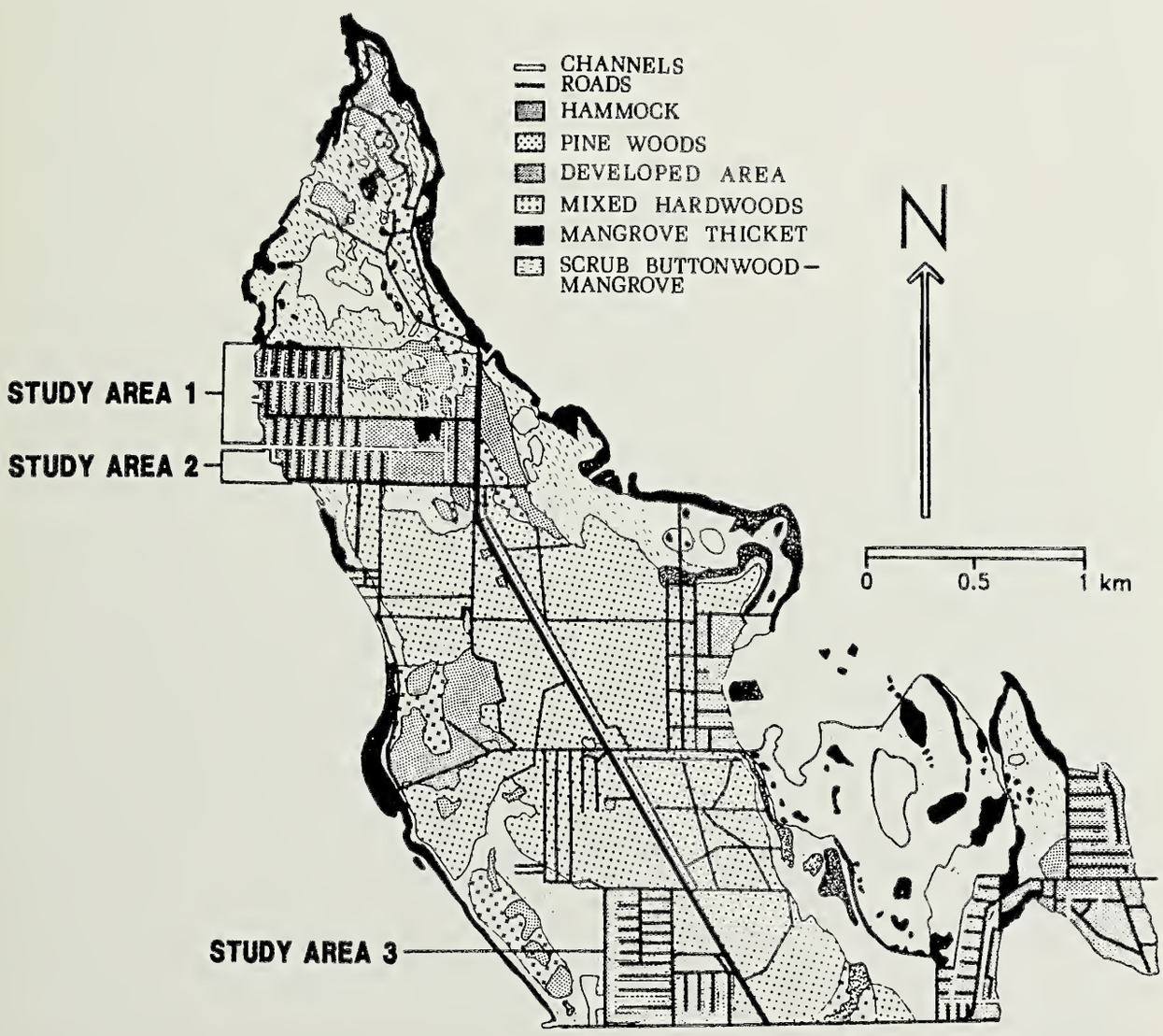

Figure 1. Study areas and surrounding habitat on the north half of Big Pine Key, Florida, where urban Key deer were observed during 1989 and 1990.

Table 1. Maximum group sizes [$\bar{X}$ ± SE (n)] of Key deer observed in housing subdivisions on Big Pine Key, Monroe County, Florida, in 1989 and 1990. Means within columns for seasons and time of day are not significantly different (P = 0.05, t-tests, F-tests, and Duncan's Multiple Range Tests) when followed by the same letter.

	Study area		
	One	Two	Three
Seasons			
Fawning		12.1 ± 1.7 (12)AB	
Postfawning	4.9 ± 0.7 (8)A	10.5 ± 0.6 (8)AB	3.4 ± 0.4 (9)A
Rut	1.2 ± 0.3 (17)B	9.7 ± 1.1 (23)B	2.1 ± 0.3 (20)B
Postrut		14.7 ± 1.4 (14)A	
	$t = -5.5$	$F = 3.1$	$t = -2.4$
	$P < 0.0001$	$P = 0.0341$	$P = 0.0220$
Time of day			
Morning	3.1 ± 0.7 (11)A	13.8 ± 0.9 (24)A	2.8 ± 0.3 (13)A
Mid-day	0.7 ± 0.3 (3)A	6.1 ± 1.1 (15)B	0.3 ± 0.2 (6)B
Evening	2.2 ± 0.7 (11)A	13.1 ± 0.9 (18)A	3.4 ± 0.3 (10)A
	$F = 1.5$	$F = 17.9$	$F = 16.1$
	$P = 0.2533$	$P = 0.0001$	$P = 0.0001$

eight adult and yearling does, and one fawn. During rut, groups usually included an adult buck, five adult and yearling does, and five fawns. These large groups observed during all seasons usually represented associations at or near areas where deer were fed by people. Maximum group size differed with time of day, with means for morning and evening greater than for mid-day (Table 1).

Study Area Three.—Mean maximum group size during postfawning was greater than during rut (Table 1). Groups consisted mainly of two "identifiable" adult females with two fawns that predictably loafed near a house where they had been fed. Maximum group size differed with time of day, with means for morning and evening greater than mid-day (Table 1).

Comparison of Study Areas.—Group sizes of Key deer observed in subdivisions during 1989 and 1990 were associated with the amount and consistency of feeding and watering by people. Maximum group size observed in study areas one, two, and three was 7, 21, and 5, respectively. Four households in study area one were known to provide food or water for deer, but feeding was not a daily occurrence and usually only table scraps were provided. Feeding of deer by tourists was minimal in study area one. In study area three, where maximum group size was similar to that of study area one, deer were fed landscape vegetation (normally unavailable to them because of a fence) on a regular basis at one household. Feeding by tourists was minimal. Extremely large group sizes (Fig. 2) observed at study area two were largely associated with consistent daily feeding and watering at a single residence. Large amounts of commercial feed (cracked corn, pelleted vegetable matter) were provided in a feedlot

operation two-three times daily. Five other households within 100 m and at least four other households in the west half of study area two also provided food and/or water. Large numbers of deer consistently gathered at the west end of the study area every morning and evening near feeding time. This attracted many tourists who also fed the deer.

Degree of domestication of Key deer, like group size, was associated with consistency of feeding and watering by humans in the three study areas. In study area one, where feeding was least consistent, deer fled from humans. In study area three, where feeding was more consistent, deer exhibited signs of domestication (i.e., permitted close approach by humans). Deer of study area two approached humans to beg for handouts.

DISCUSSION

Mean maximum group size varied by season in all study areas. Relatively larger group size in study areas one and three during postfawning probably reflected movements to open areas with breezes during periods of high mosquito levels (Hardin 1974). In study area two relatively smaller sizes during rut were probably due to disturbance of feeding associations of does by rutting bucks.

Geographical distribution of habitats and physical features may have affected where deer were likely to congregate. Study area two provided

Figure 2. Large Key deer herd in a housing subdivision on Big Pine Key.

important open areas and was adjacent to an interspersion of relatively high quality habitats. Deer traveling north along the west coast of Big Pine Key and encountering the canal system of Port Pine Heights would be funneled into the west end of the subdivision (Fig. 1).

Based on repeated observations of identifiable individuals and consistency of group composition as to age and sex, we determined that many Key deer were "permanent" subdivision residents. This was most apparent in study area two where deer seemed dependent on feeding and watering.

The degree to which individual deer supplemented food from people with natural forage varied. Some spent considerable time foraging for native vegetation in vacant lots and on adjacent refuge lands where a distinct browse line was evident. Other deer concentrated on landscape plantings and some, especially adult bucks, specialized in opening trash bags and cans for scraps.

Movements of deer in study area two have apparently been affected by contact with people. A constant food and water supply has resulted in a reduction of home range size. In the west half of study area two where feeding was heaviest, density of deer was about 20 times that of "normal" (1 deer/12 ha, Silvy 1975). Deer moving from subdivision to refuge lands and vice versa were required to cross the busiest road in study area two; they often used this paved road as a trail. Even with speed limits as low as 40 km/hr (25 mph), 12% of Key deer road mortalities 1968-1988 occurred in subdivisions (Drummond 1989).

Key deer in study area two resembled a herd of cattle. Deer at the house where commercial feed was provided (the "feedlot") were fed in a long line on a concrete patio. In feeding, they stood side by side, often in physical contact. The deer generally moved with a slow walk with heads down in single file, following no apparent leader or dominant individual. Response to potential danger was usually no more than a glance in the direction of the source. Deer often bedded in open sites within 2 m of a road and were not disturbed by cars, pedestrians, and cyclists. Loud noises from within 40 m, such as circular saws, lawn leaf-blowers, and wood chippers brought little response. Deer usually ignored the observer, sometimes passing within 2 m. Even when they were not actively "begging," deer in study area two tolerated petting by people.

Group sizes of deer, especially in study area two, were in contrast with the findings of Hardin et al. (1976), who described Key deer as relatively more solitary than other white-tailed deer. Groups of ≥ 6 Key deer comprised only 0.09% of Hardin et al.'s (1976) 13,743 observations, and were considered temporary feeding or reproductive associations.

On two occasions during the 1989-1990 rutting season, four bucks were observed in close proximity and no sign of aggression was evident. Hardin et al. (1976) stated that during rut adult males were not observed

together unless there was aggression between them or attendance of a female. Breakdown in intraspecific behavior also seemed to occur in concentrations at the feedlot where there was little evidence of an expected matriarchal hierarchy and deer moved about in a random fashion. Dominance-submissive displays were not commonly observed, in contrast to Hardin's (1974) report that such usually occurred prior to recognition of an unknown deer. With the same group of deer at the feedlot day after day, meeting of "strangers" was probably a rare event; therefore, a decrease in behaviors which established recognition and social order would be expected.

Based on comparisons of Key deer group sizes, movements, and behaviors in 1989-1990 with those from 1968-1973, it appears that the sociobiology of the Key deer herd in certain subdivisions is being drastically affected by increasing contact with people. Changes in behavioral traits (i.e., reaction to presence of people, intraspecific interactions), as observed for Key deer, are the most important evidence of domestication (Price 1984).

Loss of alarm and flight response was observed for Key deer that were in daily contact with neighborhood dogs. We speculate that this may result in an increase in susceptibility to harassment by other dogs. Also of concern are dietary imbalances as unnatural food sources replace the normally highly diverse diet of wild deer (Klimstra and Dooley 1990). A high proportion of fawns in groups of deer that beg from people suggests that recruits into the Key deer population may be adapting to dependency on humans for food. Grizzled coats in deer that frequent the feedlot situation suggest presence of parasite/disease or other stress-related problems. A single dominant buck was usually present at the feedlot during the 1989-1990 rutting season. Presence of the same buck over multiple rutting seasons may have resulted in inbreeding. A comprehensive research program involving capture, marking, and monitoring of urban Key deer will be necessary for providing empirical evidence of these potential problems.

The problem of urbanization and domestication of Key deer is not restricted to the three study areas described in this paper; evidence has been observed throughout Big Pine Key and several neighboring keys. While this paper was in review, a domesticated Key deer was beaten to death with a baseball bat on Noname Key. Problems associated with urban Key deer may escalate because new residents on the island, upon seeing their neighbors feed the deer, probably are more inclined to do so.

Wildlife managers should feralize domesticated Key deer and prevent further domestication. Heavy feeding of deer has taken place at least several years; therefore, remedial actions should be taken immediately because gene pools altered by domestication may result in high mortality when animals are "reintroduced" or feralized back into natural habitats

(Price 1984). Feeding of Key deer is prohibited by state [F. A. C. 39-27.002 (5)] and federal (16 U. S. C. 1531) laws. Enforcement of these laws must be the first step in the feralization process.

In concert with stringent enforcement of the no-feeding laws, consideration should be given to capturing domesticated Key deer for movement to improved habitats on other islands within the Key deer range. Such actions would help alleviate the problems associated with the "weaning" of deer that would be expected to remain at their former feedlots after cessation of feeding. Capture techniques involving use of a portable net (Silvy et al. 1975) and a hand-held net gun (Drummond 1989) have been developed that result in relatively little injury or mortality of Key deer; however, relocation of domesticated Key deer may result in an unknown level of mortality.

Florida Keys residents are already encouraged to dump open vessels of rainwater to discourage mosquito propagation. Such practices also will discourage attraction of Key deer. Fresh water sources (natural wetlands and artificial watering devices) should be maintained on refuge land away from subdivisions. Other habitat management practices such as maintenance of forest openings and burning should be implemented to lure deer away from concentrations of people.

An explosive increase in human population on the limited insular habitat of the Key deer presents challenges for wildlife managers. Perhaps one of the greatest problems on Big Pine Key and in suburban and urban areas throughout the country is how to balance the needs of wildlife with the various attitudes of the public. An aggressive and continuous public education program is essential for teaching about the problems of feeding deer and the necessity of management practices such as prescribed burning. There must be diligent implementation of all laws designed to protect Key deer from people activities.

Acknowledgments

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NOTES

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An Unusual Nest Site of the Florida Sandhill Crane in Southeastern Florida

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Florida Sandhill Cranes (*Grus canadensis pratensis*) rarely nest in an already dry site (Layne 1982; Nesbitt, pers. comm.). The few reported dry ground nests of cranes in Florida occurred in typical, albeit de-watered habitats within appropriate vegetative cover (Sprunt 1963, Layne 1982). These nests were smaller and more simply constructed than the typical bulky nests built by Sandhill Cranes in preferred aquatic sites (Layne 1982; Nesbitt, pers. comm.).

On the morning of 14 March 1990, I investigated a report of a Sandhill Crane nesting on the ninth fairway of the Sebastian Municipal Golf Course in northern Indian River County, Florida. At a distance of 50 m I saw the cranes guarding a single egg lying on the manicured fairway grass devoid of a nest structure (Fig. 1). From only 2 m away I detected the presence of a few scattered sticks, sedges, and feather down placed in a desultory

Figure 1. Florida Sandhill Crane nest site on Sebastian Municipal Golf Course fairway. Note a single egg lying next to adult crane's feet.

fashion adjacent to and under the egg (Fig. 2). A second egg was laid on 16 March, but no additional nest material was added. The nest site was about 10 m from the edge of a small pond fringed by cattails (*Typhus sp*) and less than 30 m from the midline of the fairway, with a nearly constant procession of golfers and golf carts.

Based on the average flushing distance for this subspecies in the Treasure Coast Region (Toland, pers. obs.), I normally recommend that buffer zones for Sandhill Cranes nesting in proximity to development be at least 100 m in radius around the nest site. However, this golf course pair was apparently habituated to human activity, for they could not be distracted from their normal activity patterns unless approached to within 25 m. Thus, a 0.6 m high fence was placed ca. 25 m from the nest, creating a buffer zone based specifically on the estimated disturbance distance threshold for this particular pair of cranes.

On the morning of 18 April both eggs hatched after 33 and 35 days of incubation, respectively. The fact that the eggs were incubated considerably longer than the average 29-31 day incubation period (Nesbitt, pers. comm.) suggests the birds may have been disturbed by golfer activities enough to disrupt normal incubation. The two chicks accompanied the adults as they walked around the golf course foraging primarily for northern mole crickets (*Gryllotalpa hexadactyla*). One chick disappeared at about 2 weeks of age and the remaining young was missing at between 4 and 5 weeks of age.

The incidence of dry land nesting by Florida Sandhill Cranes may be influenced by drought (Layne 1982). However, of 15 crane nests that I observed during the spring of 1990 (a severe drought year in south Florida), all but the aforementioned nest were located in typical wetlands. The selection of such an odd and suboptimum nest site as a crowded golf course fairway may be evidence of an inexperienced breeding pair of cranes. The failure to fledge any young is typical of inexperience pairs that, while producing offspring, rarely are successful in raising young to 80 days of age (Nesbitt, pers. comm.).

Figure 2. Florida Sandhill Crane nest on day of hatching.

This case illustrates the behavioral plasticity of Sandhill Cranes and supports the concept of developing nesting buffer zones derived from the disturbance tolerances of a given nesting pair. However, the protracted incubation period described herein provides evidence that even seemingly habituated Sandhill Cranes can be adversely affected through subtly stressful encounters with humans.

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The First Successful Nesting of Wood Storks on Arthur R. Marshall Loxahatchee National Wildlife Refuge

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Located in central Palm Beach County, the Arthur R. Marshall Loxahatchee National Wildlife Refuge totals 57,906 ha. The habitat is characterized as northern Everglades habitat consisting primarily of a matrix of wet prairie and slough communities in which thousands of tree islands are located. The tree islands, ranging in size from 0.1 to 50 ha provide suitable substrate for wading bird nesting. In typical water years (i.e., years where water levels are not impacted by drought) as many as 200 islands are used as rookery locations in the Refuge, supporting 15,000 nesting pairs of wading birds. Colonial wading birds which nest on the Refuge include White Ibis (*Eudocimus albus*), Little Blue Herons (*Egretta caerulea*), Great Blue Herons (*Ardae herodias*), Snowy Egrets (*E. thula*), Great Egrets (*Casmerodius albus*), Cattle Egrets (*Bubulcus ibis*), and Tricolored Herons (*E. tricolor*). White Ibis often are the most common of the nesting wading birds, with as many as 12,000 pairs nesting on the Refuge.

In order to monitor wading bird nesting on the Refuge, surveys of colonies are conducted each year by the Refuge staff. Surveys are conducted on the ground using airboats, and aerial surveys are conducted using both fixed- and rotary-winged aircraft. Surveys are conducted beginning in late January, and continue through early July. Typically, Great Blue Herons are the first to nest, with many initiating nesting in January. By mid-March, most species have begun nesting, and White Ibis have been found incubating eggs as late as July. Despite the fact that typically up to 1,000 Wood Storks (*Mycteria americana*) forage within the Refuge from mid-December through early June (Hoffman et al. 1987, 1988, 1989) there are no records of Wood Storks successfully nesting on the Refuge (Kushlan and Frohring 1986). In 1981, about 100 Wood Stork nest platforms were found

on the Refuge (Takekawa 1982). All of these nests were abandoned and no hatchlings were found in any of these nests.

On 13 March 1990, during an aerial wading bird rookery survey, 20 Wood Storks were observed in a colony of about 2,000 pair of White Ibis. We visited this site, located at 26° 25′ 25″ N, 80° 22′ 15″ W, on 26 April 1990, in order to conduct research activities. While at the rookery, which by this time had grown to about 4,500 White Ibis nests, with lesser numbers of Snowy Egrets, Great Egrets, and Tricolored Herons, 8 Wood Stork nests were found and inspected. The rookery island was vegetated primarily with sawgrass (*Cladium jamaicensis*), and the majority of ibis nests were ground nests. A small willow (*Salix caroliniana*) clump on the western side of the island was the site of several hundred Tricolored Heron, Snowy Egret and Great Egret nests.

The Wood Stork nests, all of which were located in a single strangler fig tree (*Ficus aurea*) embedded with the largest willow clump, were examined using a mirror on an extendable pole. Four of the nests inspected were being tended by adult Wood Storks and had fresh vegetation in them, but contained no eggs; two of the nests contained 2 eggs, one nest contained 3 eggs, and one nest contained 2 hatchlings, about 5 days old. The colony was revisited on 22 June 1990. Fifteen Wood Stork young were observed in or near 7 nests. One nest that Wood Storks initially constructed contained two nestling Anhingas (*Anhinga anhinga*). Young Wood Storks were seen flying up to 15 m from their nests. A final visit was made to the colony on 9 July 1990. Eight immature Wood Storks remained in the colony at this time, with up to 13 adult Wood Storks present. All but one of the immature birds were observed flying more than 50 m from the colony. These represent the first confirmed successful nesting of Wood Storks on Arthur R. Marshall Loxahatchee National Wildlife Refuge since its establishment in 1951. Like the nests constructed in 1981, those reported in this note were initiated in March, located in the southern portion of the Refuge, and the nesting attempts occurred during a period of drought. During periods of drought, nesting areas typically used by Wood Storks in the Everglades lack sufficient water to support colony establishment. During these times, areas such as the south end of the Refuge, where water is impounded, become extremely important as nesting areas for all species of wading birds which nest in the Everglades.

In the southern Everglades, Wood Storks which initiate nesting after January generally fail to fledge young (Ogden 1989). Wood Storks require 15 to 21 weeks following colony formation to fledge young (Kahl 1964). Because successful fledging of young requires a great deal of food, young Wood Storks must be on their own prior to the onset of the rainy season in early June. Once the summer rains begin, prey populations, which had become concentrated due to falling water levels and reduced areas of inundation, disperse into newly flooded marshes. The resulting prey densities fall below that which is necessary for adult Wood Storks to provide adequate food resources to nestlings. This results in abandonment of nests and nest failure (Ogden 1989). The Wood Stork nests found within ARM Loxahatchee NWR were initiated after mid-March. Typically, nests initiated that late in the season are expected to fail. Of the 8 nests on the Refuge, however, only one failed while the others fledged an average of 2.1 young. These were the first Wood Storks known to be produced on the Refuge since its establishment.

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Multiple Clutches and Nesting Behavior in the Gulf Coast Box Turtle

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Although many North American emydid turtles typically lay more than one clutch of eggs per year, this does not appear to be generally true of the eastern box turtle (*Terrapene carolina*), whose range encompasses much of the eastern United States. However, Dickson (1953) recorded annual production of as many as four clutches by captive female Florida box turtles (*T. c. baurii*) in southern Florida, and Legler (1958) noted the presence of two sets of corpora lutea in some females taken from peninsular Florida and southern Mississippi. Based on gonadal examinations, Tucker et al. (1978) postulated the routine occurrence of multiple clutches in a Florida panhandle population of the largest extant subspecies, the Gulf Coast box turtle (*T. c. major*). However, because follicular atresia as well as ovulation may produce corpora lutea, and because there is no assurance that enlarged and preovulatory follicles will be ovulated, direct observations of multiple nestings are needed to verify this phenomenon. In this paper I confirm the hypothesis of Tucker et al. (1979) via repeated observations of nesting by a single female Gulf Coast box turtle during a five-year period.,

On 18 February 1986 I acquired a pair (male and female) of adult Gulf Coast box turtles that had been collected two days earlier in floodwaters of the Ochlockonee River (T2N, R1W, sec 18), Leon/Gadsden County Line, Florida. Respective maximum carapacial/plastral lengths (mm, CL/PL) of the male and female were 178/171 and 160/160. The female showed no linear growth throughout the study; her non-gravid mass was about 730 g. Along with several other resident Gulf Coast and eastern (*T. c. carolina*) box turtles, both were allowed to roam freely in my fenced, 570 m^2 back yard, which consists predominantly of a mixed, mesophytic hardwood hammock in northern Leon County. In the southeast corner is a 30 m^2 barren to grassy area that slopes up to the hammock (maximum elevational difference = 40 cm). During heavy rains, the lower area is prone to brief flooding, with the soil remaining saturated for several days. A small artificial "pond" (33 cm diameter, 8 cm maximum depth) provides water. Bananas, tomatoes, and earthworms were offered occasionally to supplement naturally obtained food, which included mushrooms, invertebrates, and other organic matter.

Table 1. Observed clutches produced by female Gulf Coast box turtle (*Terrapene carolina major*), Leon/Gadsden County, Florida.

Date	No. of eggs	Mean egg mass (g)	Mean egg L (mm)	Mean egg W (mm)	H[1]	Days to pipping (°C)
12 Jul 1986	4	12.0	39.1	22.8	4	81-84 (23-27)
12 Jun 1987	4	11.3	38.0	22.5	2	68-70 (24-31)
5 Jul 1987	5	12.0	37.9	22.4	1	63 (23-31)
1 Aug 1987[2]	1	–	–	–	–	–
23 Jun 1988	5	11.9	39.2	22.8	0	– (24-29)
24 Jul 1988	4	11.1	38.3	22.2	1	69 (24-29)
25 Jun 1989	5	11.6	38.1	22.5	2	50 (33), 66 (27)
20 Jul 1989	4	–	38.5	21.9	0	– (1 at 27)
17 Aug 1989	3	–	40.1	21.8	0	– (27, 33)
11 Jun 1990	5	12.0	40.2	22.5	3	51-57 (30)
8 Jul 1990	3	11.3	38.0	22.4	2	82-84 (24-26)
2 Aug 1990	4	10.5	38.1	21.8	1	54 (30)

[1]H = number hatched from clutch.
[2]Date of X-ray, not of oviposition.

Since obtaining them, I have observed the male mounting the female in all months from March through October, with prolonged intromission occurring at least on 12 August 1988 and 1 June 1989. Although the male has mounted at least four other females, I have never recorded the female being mounted by any of the three other resident, sexually active males. Repeated observations of agonistic behavior by both individuals toward adults of their own sex as well as toward an immature individual clearly establish the pair as the dominant male and female.

I first observed the female nesting on 12 July 1986. During the following four years she produced at least two to three clutches annually from mid-June to mid-August. On 29 July 1987 she began nest construction but abandoned the effort, presumably because of insufficient soil moisture. An X-ray taken three days later revealed the presence of a single shelled egg. Table 1 summarizes data for all known clutches. It is possible that I failed to witness additional nestings during this period. Internesting intervals between observed nestings within years were 23, 30, 25, 28, 27, and 25 days.

Except in two instances when I artificially watered the area, all but three nestings occurred on days on which there had been substantial rainfall, usually following several dry days. The June 1989 nesting occurred on the first sunny day after two weeks of rainy weather (the wettest June on record for Tallahassee). The August 1989 and 1990 nestings each occurred one day after a heavy, late afternoon thunderstorm. Precipitation was well below normal in 1988 and 1990 but above normal in 1989. All nestings began near dusk (1730-1915 hr EST) and were completed after dark (from 2100-2300 hr EST). This pattern apparently is typical of the species (Ernst and Barbour 1972). The female was observed soaking in the pond for up to two hours daily on the days immediately preceding most nestings. Following nesting, she invariably lay "exhausted" above the nest for 1-2 hours, then walked directly to the pond, where she again soaked for 12-30 hours, much as noted by Dickson (1953) for Florida box turtles.

Nest site selection was remarkably invariant. Six of the 11 observed nest sites were within 10 cm of each other, at the base of a small sweetgum tree (*Liquidambar styraciflua*); a seventh was dug 1.5 m to the north, and the remaining 4 were within a few cm of

each other but 5 m north of the first site. All were just below the top of the slope and at the edge of the forest. Presumably this provides sufficient sunlight for incubation while concomitantly protecting the eggs from flooding. Stickel (1989) noted analogous nesting migrations from bottomlands to repeatedly used drier upland sites among a free-ranging population of eastern box turtles in Maryland.

I removed all eggs for measurement and subsequent incubation within 12 hours of nesting. Three of the four July 1989 eggs had been depredated from below ground and were swarming with ants; it was not determinable whether the ants themselves or possibly a small vertebrate (shrew tunnel present) had instigated the predation. Mean egg size (38.6 x 22.3 mm, n = 46; 11.6 g, n = 39) was only slightly larger than Gulf Coast box turtle eggs measured by Tucker et al. (1978: 37.8 x 21.3 mm, 11.2 g) and Ewert (1979: 38 x 22 mm) and likely reflects the relatively large size of the female (PL = 132-162 mm for females examined by Tucker et al. 1978). Likewise, hatchlings were correspondingly larger than those recorded by Tucker and Funk (1977). Mean hatchling measurements, recorded 10 to 20 days after pipping but before feeding, were 33.9 mm PL (28.5-38.8, n = 14), 35.9 mm CL (31.8-39.7, n = 14), and 9.5 g (8.3-11.3, n = 11).

The production of multiple annual clutches may be typical of this subspecies; at least three other experienced reptile keepers (Richard Bartlett, Mike Ewert, Joe Ward, pers. comm.) have advised me that female Gulf Coast box turtles in their care have laid more than one clutch per season. These data, therefore, corroborate the anatomically based predictions of Tucker et al. (1978) and, in fact, exceed even their more liberal estimate of a female's annual reproductive potential (9.25 eggs). Though limited, the present data also suggest a general but inexact decline in clutch size throughout the season. This trend likewise appears to characterize other species of box turtles (*Terrapene coahuila*: Brown 1974; *T. ornata*: Legler 1960) in which at least some females are believed to lay more than one clutch annually.

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Notes on the Natural History of *Anolis desechensis*

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The Desecheo Anole (*Anolis desechensis*) is endemic on Desecheo Island, Puerto Rico (Heatwole 1976). It is a member of the *A. cristatellus* complex. The presence of this anole on Desecheo Island was first reported by Wetmore (1918).

Desecheo Island is a small (122 ha) mountainous island off the western coast of Puerto Rico in the Mona Passage (Morrison and Menzel 1972). The island is composed primarily of deformed or fragmental volcanic rocks of early Tertiary origin and the island vegetation includes a seasonal deciduous woodland and a thorny cactus-scrub (Woodbury et al. 1972).

The known herpetofauna of Desecheo consists of the snake *Alsophis portoricensis* (Grant 1932), and the lizards *Ameiva desechensis* (Heatwole and Torres 1967), *Sphaerodactylus levinsi* (Heatwole 1968), *Mabuya mabouya* (Meier and Noble in prep.), and *A. desechensis*. The only description of the natural history of *A. desechensis* was presented by Heatwole (1976): "At present *A. monesis* on Mona has a structural niche and general ecology almost identical to that of *A. cristatellus* on Puerto Rico (Gorman and Stamm 1975). My casual observations suggest the same is true of *A. desechensis*." Gorman and Stamm (1975) described *A. monesis* as "a typical 'trunk-ground' lizard." They also provided data on its perching behavior and mentioned that individuals were observed eating berries.

Specimens of *A. desechensis* were observed during each of our three visits to Desecheo Island in March, July, and October 1987. Observations of *A. desechensis* were incidental to our purpose on the island and were not systematic; however, due to the dearth of information on the natural history of *Anolis desechensis*, we feel that our casual observations are worth reporting.

The anoles appeared to be most common on shore near the vegetation line. Almost every pile of rocks had an adult male and several females associated with it. The males were most frequently perched in a conspicuous location, whereas females were more likely secretive in crevices between the rocks. The abundance of anoles near the shore may be attributable to the influx of food organisms living on the flotsam.

Desecheo anoles were less readily observed, but still common, in the seasonal deciduous woodlands. In this habitat, males were most frequently observed displaying head downward on the lower trucks of gumbo limbo trees (*Bursera simaruba*). Females and immature males were rarely observed in such exposed situations. However, females were thus exposed during actual mating. These observations correspond with those of Kiester et al. (1975) who found that large male *A. cristatellus* had a tendency to flee to large trees, whereas females and juveniles exhibited a greater tendency to flee into grass and other low-lying dense vegetation.

Desecheo anoles appeared relatively uncommon in the thorny cactus-scrub communities found on upper slopes and ridge tops. Desecheo anoles became active at dawn and seemed to display a shift in habitat utilization coincident with increasing activity of *Ameiva desechensis*. The anoles showed a tendency to avoid perches on or near the ground during periods of high *Ameiva* activity during the heat of the day. Anoles frequented low perches in the early morning and late afternoon, and they tended to cling to slender branches at night.

On the beach, Desecheo anoles were frequently observed sallying after flies. On two occasions in October, one anole was observed catching a grasshopper and another a moth. On 19 July 1987, an adult male anole was observed head downward on the trunk of a *Bursera simaruba* while eating an anole egg. Cannibalistic oophagy occurs at a constant, low level among many species of reptiles (Polis and Myer 1985). Adult *Anolis lineatopus* have been documented cannibalizing juveniles of the species (Rand and Andrews 1975). Cannibalism in reptiles is most frequently attributed to opportunistic prey capture as part of normal feeding behavior (Polis and Myers 1985). However, the leaf litter and soil foraging best suited for finding lizard eggs is not typically part of the foraging repertoire of *Anolis*. Anoles are sit-and-wait foragers (Stampes et al. 1981).

The natural history of *A. desechensis* is quite similar to that of other members of the *A. cristatellus* complex. It displays similar foraging and perching strategies and even is preyed upon by the same species of snake. On 15 March 1987, an *Alsophis portoricensis*, upon capture, regurgitated an *Anolis desechensis*.

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Golden-crowned Sparrow Appears in Florida

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On the morning of 20 June 1990, Mr. and Mrs. S. Lindskold of Islamorada heard an unfamiliar bird song in their backyard, and quickly located an unfamiliar sparrow. They identified it as a Golden-crowned Sparrow (*Zonotrichia atricapilla*) and took several photographs. Mr. Lindskold called Richard Sawicki, who observed the bird at leisure with Cynthia Thompson shortly after noon, and confirmed the identification. Wayne Hoffman (hereafter WH) observed it the morning of 21 June and took several photographs. Mary Carrington (hereafter MC) observed it at mid-day of 21 June. The bird remained in the Lindskolds' yard throughout the day on the 20th and the 21st, but was not seen thereafter. This seems to be the first report of a Golden-crowned Sparrow in Florida and is certainly the first documented occurrence in the state.

While in the Lindskolds' yard, the Golden-crowned Sparrow fed on bird seed that had spilled from the cages of their captive parakeets. It usually remained low in the open shrubbery around their porch, and often entered the porch to approach the spilled seed. It occasionally sang the characteristic song, consisting of three pure, whistled notes. When MC observed the sparrow in midday, 21 June, it sat quietly in the shade and appeared to be suffering from heat stress, as it engaged in continuous gular fluttering.

The sparrow was in adult plumage (Fig. 1). The strong head pattern is quite diagnostic. Very heavy black stripes passed above the eyes and extended onto the back of the head, where they nearly met. Between the stripes, the bird had an intense yellow forehead patch extending from the base of the bill back just beyond the eyes. Behind this yellow patch, the space between the black stripes was occupied by an occipital patch of pale gray. The cheeks and sides of the neck were gray, a few shades darker than the occipital patch.

The upper parts were tawny brown, with heavy blackish stripes on the back, rufous in the wing-coverts, and a suffusion of gray on the edges of the rump. The flanks were warm brown, fading to gray on the throat, breast and belly.

The bill was heavy and conical. It was dark above and dull pinkish on the sides of the mandible. The feet were quite pink, brighter than in the illustrations in most of the several field guides examined. Only a photograph in the Audubon Society Master Guide to Birding (Farrand 1983) shows this pink color adequately. In our experience, North American field guides have not done an adequate job of illustrating foot colors of sparrows, perhaps because most illustrators have worked primarily from museum skins.

Golden-crowned Sparrows nest in western North America from Alaska south through British Columbia to extreme northern Washington and southwestern Alberta. They winter from southern Alaska to Baja California and are casual in winter east to Utah, Colorado, and New Mexico; a scattering of winter records are documented east of the Mississippi River (AOU 1983). These eastern records are mostly in the northern states, east to New York, Massachusetts (and Nova Scotia). In the southeast records are available for southern Louisiana and southern Alabama (AOU 1983). This record is highly unusual and difficult to explain. The dates, in late June, are long after normal migration, in a season when the bird should have been nesting in the lush, cool rain-forest zone of the northwest coast.

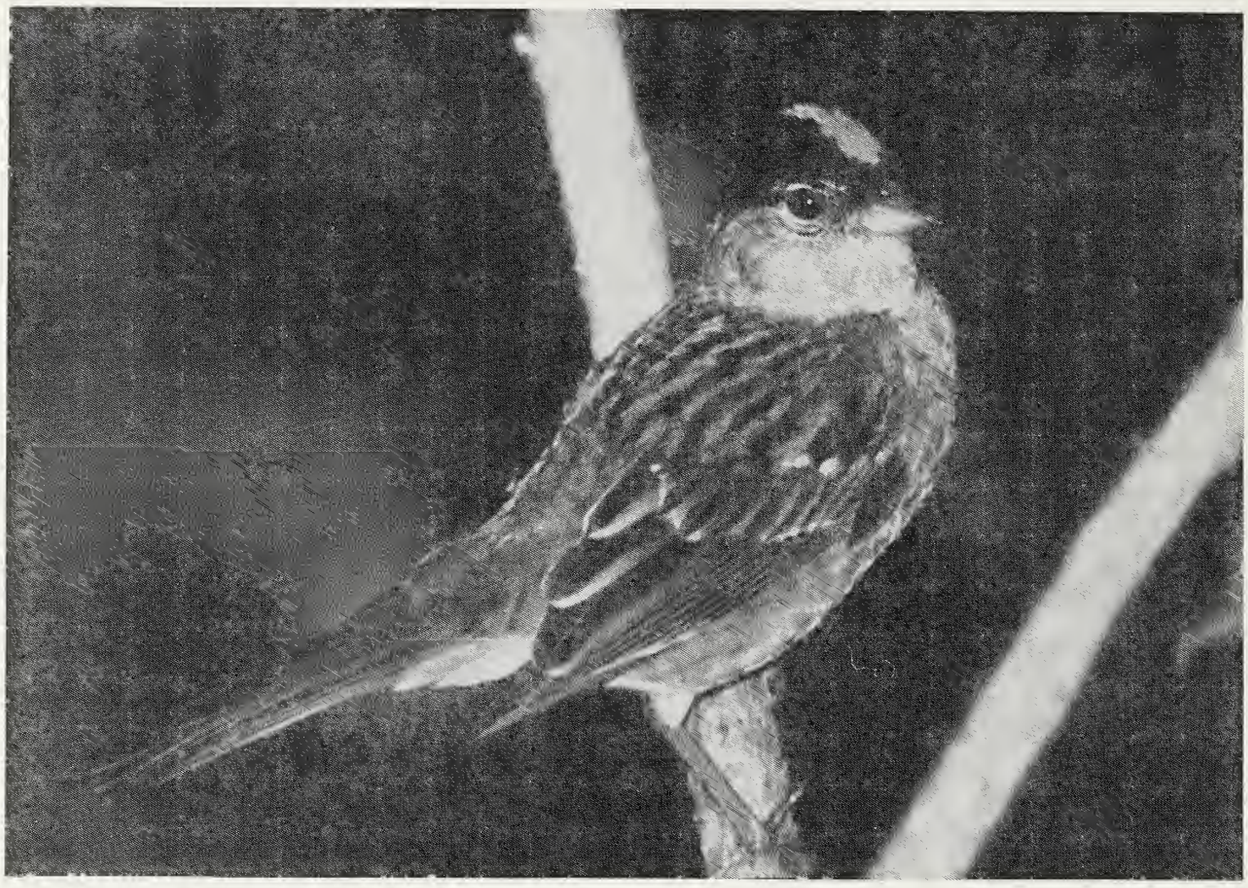

Figure 1. Golden-crowned Sparrow photographed in Islamorada, Monroe County, Florida, on 21 June 1990.

People in this species' range rarely keep local wild birds as pets, so transport as a captive is unlikely. WH, however, examined the plumage, claws, feet and bill carefully for signs of injury, abrasion, abnormal growth, or unusual wear. The plumage was clean and showed no abnormal wear. The primaries, secondaries, and rectrices were in good condition with minimal wear, and with none of the tip damage common in caged birds. The plumage of the upper back, wing coverts, and underparts was moderately worn, as is typical of brush-dwelling sparrows in summer. The white of the wing-bars was partially obliterated by wear, but otherwise this wear did not affect the plumage pattern. On the forehead, just in front of the eyes, a crease or line is evident in some of WH's photographs. This crease resembles the type of feather damage often seen in caged birds that struggle to escape through cage wire, but on the Golden-crowned Sparrow it was very minor and appeared very recent. We suspect this crease may have been acquired by the bird attempting to steal seeds from the parakeets' cage. The claws, feet, and bill all appeared completely normal, without any evidence of unusual abrasion, injury or abnormal growth. The photographs also showed no evidence of abnormalities to the bill or feet. One photograph shows the bird head on, with its bill open. The bill edges (tomia) lack the chips and abrasions one might expect on a sparrow if it were biting at cage wire. Ship-assisted vagrancy is not impossible, but the idea of a sparrow riding a ship through the Panama Canal seems extremely unlikely. We conclude, therefore, that this Golden-crowned Sparrow most likely made its way unassisted across North America and appeared of its own volition in Islamorada.

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A Yellow-faced Grassquit in Florida, With Comments on Importation of This and Related Species

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On the morning of 7 July 1990, the Smiths were driving on an unimproved section of Biscayne Drive (SW 288th Street) through a citrus grove west of 207th Avenue in unincorporated Dade County, Florida (25°30′N, 80°32′W), about 5 km northwest of Homestead. As they approached, a tiny bird flew along the adjacent telephone line and stopped to sing a simple, single-pitched, insect-like trill. From their travels in the Caribbean region they recognized the bird as a male Yellow-faced Grassquit (*Tiaris olivacea*). Eventually they studied the grassquit leisurely through a 40x Questar, both on the wire and ground. The small finch was about 10 cm in length. Its upperparts, including most of the crown and forehead, were olive. Its eye-line was a bright orange-yellow, heavy in front of the eye, arching over and becoming thinner and whiter behind the eye. There was a thin black line above the eye-line, meeting over the bill, and a black loral stripe through the eye. The dark eye itself had a whitish partial eye-ring below. The grassquit's throat was bright orange-yellow, framed in dull black; the black extended in a line up to the base of the bill. Its cheeks were largely olive, concolor with the crown and back, and showed a few black flecks. The breast was dull blackish, slightly pale-flecked, and stood out against its grayish olive flanks and belly. Its underparts became still paler toward the vent. The tail was essentially concolor with the adjacent body, but was slightly browner. Its legs were blackish, with paler toes. The bill was blackish and relatively large and conical, giving the bird a somewhat flat-headed appearance. No abnormal wear was evident either on the plumage or the toes.

After its initial discovery, the Yellow-faced Grassquit sang repeatedly for several minutes, and then flew into the adjacent citrus grove for a short period before it returned to sing from a section of wire about 100 m farther west. This behavior continued regularly for the first two days and ultimately covered a span of about 300 m along the telephone line. As more birders arrived, the bird became increasingly shy. The grassquit first moved its primary singing post to a sprinkler head within the citrus grove, about 100 m south of the road, and later sang from bare, low branches in an adjoining avocado grove. We observed the bird to feed in the weedy grasses between the rows of trees and also at grassy spots on unpaved roads around the grove, sometimes singing directly from the ground. By 11 July the frequency of song had decreased and the bird had become increasingly difficult to locate. We are not aware of any sightings after 12 July.

The Yellow-faced Grassquit resides throughout the Greater Antilles and in Latin America from northeastern Mexico south to Colombia and northwestern Venezuela (AOU 1983). The species shows a fair amount of geographic variation, particularly between the West Indies and Latin America (Ridgway 1901). An examination by the Smiths of an extensive series at the Museum of Comparative Zoology in Cambridge, Massachusetts (MCZ), showed that populations from Central America typically have more extensively black breasts, cheeks, and crowns, unlike the olive crown, cheeks and upper flanks typical of West Indian populations. Those from Cozumel are intermediate in blackness, whereas those from Puerto Rico, at the east end of the species' range, are brighter and show a somewhat sharper contrast between the black breast and yellower underparts. Although variation in Central and particularly South American specimens (Hellmayr 1938; pers. obs.) makes absolute subspecific identification of some less-black individuals impossible, this Yellow-faced Grassquit's plumage was entirely consistent with the nominate race found on Cuba, Hispaniola, Jamaica, and the Caymans. Cuba, about 250 km south of Homestead, is the nearest site within its normal range. There, it is common in cleared areas, even on cays off the northern coast (Garrido and Garcia 1975).

The Yellow-faced Grassquit is uncommon but not unknown as a cagebird in the United States. It has been specifically protected under the Migratory Bird Treaty Act since at least 1977 (Title 50, Code Federal Regulations, Part 10.13). There were 196 birds imported between 1968 and 1972 (Banks 1970; Banks and Clapp 1972; Clapp and Banks 1973a, 1973b; Clapp 1975), compared with about a million canaries (*Serinus* sp.) over the same period (Banks 1976). Where stated, all imported Yellow-faced Grassquits came from Central America or via Europe. A small population of the species, evidently also from Central American stock, became established in Hawaii around 1974 (Pratt et al. 1987, R. Pyle *in litt.*). Since 1984, only six Yellow-faced Grassquits were imported legally through Miami, all from Costa Rica and destined for the San Diego Zoo (USDA unpublished data, *fide* C. Miles). In September 1989 an illegal shipment of birds from Mexico, confiscated in south Florida, included a number of Yellow-faced Grassquits. In July 1990 the survivors were still being held as evidence and were all accounted for (C. Miles, pers. comm.). These grassquits were inspected by the Smiths and all were of the black-cheeked, black-crowned Central American race (*T. o. pusilla*).

The Smiths located two pairs of Yellow-faced Grassquits, clearly also from Central American stock, for sale at $150/pair at a major south Florida bird retailer about 15 km from the Biscayne Drive site. This is several times the cost of most finch species, but Latin American expatriates occasionally request them and are willing to pay their going price (L. Ward, pers. comm.). The dealer had recently acquired these birds, the first available for sale in several months, from a breeder in Hialeah, the only known commercial aviculturist for this species nearby. The breeder was contacted to see whether he knew of any escapes. The breeder said that he never had lost any himself and suggested that anyone owning the species would be inclined to take special care of them, because of their value.

Although there has been no legal bird trade between Cuba or any other Greater Antillean country and the United States for many years, there is always the possibility of escape or release from an illegal shipment. The smuggling of birds into southern Florida, including finches from Cuba, is known to occur (e.g. Miami *Herald*, 20 July 1988). The particular shipment cited by the *Herald* contained many Cuban Grassquits (*T. canora*), a species supposedly popular among Cuban refugees because of its melodious song, but no adult male Yellow-faced Grassquits, whose song is notably unspectacular. The shipment actually did contain at least three juvenile male Yellow-faced Grassquits, but this fact did not become apparent until the birds subsequently molted (C. Burch, pers. comm.). The smugglers were convicted and sentenced to up to two years in federal prison (Miami *Herald*, 29 Nov. 1988). According to Brudenell-Bruce (1975), a few Yellow-faced Grassquits, being shipped to Europe in 1963 along with several hundred Cuban Grassquits, were released accidentally

in Nassau, Bahamas and became established on New Providence. Whereas the latter species remains common there even now, the Yellow-faced Grassquits died out very quickly (Green 1977). Thus, Yellow-faced Grassquits occasionally are shipped from the Greater Antilles, and may even reach the United States, but apparently only accidentally and in very small numbers.

Although the Yellow-faced Grassquit apparently has not been previously documented in the wild in Florida, there seems no *a priori* reason why the species could not occur naturally. Its wing-to-length ratio is 0.51, compared to 0.49 for the Black-faced Grassquit (*T. bicolor*) (Ridgway 1901), suggesting equivalent flight capability. The Black-faced, which occurs widely in the Bahamas but not in Cuba, has been found in Florida on several occasions since 1871 (Howell 1932, AOU 1983). The historical record of vagrancy by West Indian birds to southern Florida suggests that species found in the Bahamas, including others which have no significant Cuban populations such as the Bahama Mockingbird (*Mimus gundlachii*) and the Bananaquit (*Coereba flaveola*), occur more regularly than those absent from the Bahamas. This phenomenon may simply reflect the region's prevailing easterly winds; however, the winds are not perpetually easterly and often are southerly. Thus, species found in Cuba but not the Bahamas, including the Scaly-naped Pigeon (*Columba squamosa*), Ruddy Quail-Dove (*Geotrygon montana*), Antillean Palm Swift (*Tachornis phoenicobia*), Cuban Martin (*Progne cryptoleuca*), and Tawny-shouldered Blackbird (*Agelaius humeralis*), have all been found in southern Florida, albeit rarely (AOU 1983). Moreover, within the last decade, both the Cave Swallow (*Hirundo fulva*) and Shiny Cowbird (*Molothrus bonariensis*), neither recorded from the Bahamas but both found in Cuba, have colonized Florida. Thus, avian vagrancy from Cuba, or elsewhere in the Caribbean, is evidently possible. Several records of Cuban Grassquits in Florida between 1951 and 1980, including a breeding pair in North Miami around 1960 (Abramson and Stevenson 1961), were presumed escapees; the species is a popular cagebird and the records occurred somewhat in synchrony with waves of human immigration from Cuba. A 19th century Florida record of this species (Howell 1932) is in error (Austin 1963).

In the final analysis, the provenance of an individual bird such as this Yellow-faced Grassquit can never be determined with absolute certainty. Nevertheless, given its discovery after the species' primary breeding season when birds often wander, its increasing wariness under human pressure, its appearance as probably being a different subspecies from that normally found in captivity in the United States, the nearness of that subspecies' natural range, the species' relative lack of popularity among local bird fanciers, and the absence of any physical evidence suggesting prior captivity, this Yellow-faced Grassquit does seem a plausible natural vagrant to Florida.

We especially thank Cliff Miles of the USDA APHIS-VS Miami Import-Export Center for information concerning recent local bird importation; Bill Zeigler, Ron Johnson and Carl Burch of Metrozoo for information and an opportunity to inspect confiscated grassquits; Robert Pyle for information concernng the Yellow-faced Grassquit's origin and status in Hawaii; Linda Ward for information concerning the species' local status in aviculture and the pet trade; Raymond Paynter for access to the collection at the MCZ; and William B. Robertson, Jr. for suggesting improvements to an earlier draft of this note. Sonny and Jason Bass, Virginia Edens, Roger Hammer, David Lysinger, John Ogden, Bill and Betty Robertson, Kitty Suarez, Mickey Wheeler, and others all hurried to confirm the discovery, while Dan Hodgman, Mike Hunt, and Norman Sutton helped arrange or allowed birders to have limited access to the property. Color slides of the Yellow-faced Grassquit near Homestead taken by the Smiths and by Hoffman have been deposited in the archives of the Florida Ornithological Society at the Florida Museum of Natural History (File no. FOS 78).

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FIELD OBSERVATIONS

Prepared by the Field Observations Committee

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The sightings reported here are largely unsubstantiated field observations and have not been reviewed by the FOS Records Committee. As such, the observations should be considered tentative pending a more formal review. We encourage observers to submit appropriate records to the Records Committee c/o Jocie Baker (Secretary), 851 N. Surf Rd., #302, Hollywood, FL 33019.

Several conventions have been adopted to save space. A 3-character set of alpha-numeric initials is used to identify contributors within the accounts of individual species. A complete list of observers and corresponding initials is provided at the end. The list of observers is organized alpha-numerically by the 3-character initials. Names of observers for each report are drawn from a master list, and this procedure may result in occasional gaps in the alpha-numeric sequence (e.g., the listing of LA2 without a previous LA1).

Another convention adopted is the use of common names exclusively. Persons interested in scientific names should consult AOU (1983. Check-list of the North American Birds, 6th ed. Washington, D.C.: Am. Ornithol. Union) and revisions as published in The Auk. Other uncommon abbreviations used occasionally are: BBS, breeding bird survey; CBC, Christmas Bird Count; m. obs., many observers; NP, national park; NWR, national wildlife refuge; SP, state park; and SRA, state recreation area. Unless necessary, the counties of named locations are omitted.

The Field Observations Committee would like to thank everyone who contributed to this column. Please bring any unreported sightings to our attention by writing to Jim Cox, compiler.

Summer Report: June-August 1990

As has been the case with previous reports for 1990, drought conditions continue to influence distributions and abundances of birds around the state. Extra-range sightings of Snail Kites, certain wading birds, and waterfowl were reported from several northern areas of the state. One of the more noteworthy of these was a Roseate Spoonbill in Columbia Co. There were also high counts of Snail Kites in Polk and Osceola Cos., while no nesting was reported for many areas in the Everglades.

Southerly breeding attempts were noted for several songbirds. Indigo Buntings and Blue Grosbeaks were noted in new areas in central and southern Florida, and there were southerly breeding attempts reported for Hooded Warbler, Eastern Wood-Peewee, Belted Kingfisher, Mississippi Kite, and Field Sparrow. Several large concentrations of terns and skimmers were noted at new areas where breeding has not been reported. These areas should be followed closely in future years to monitor the potential development of colonies. A survey of coastal areas from Homossassa (Citrus Co.) to Steinhatchee (Taylor Co.) found no nesting colonies of terns or skimmers along this large coastal stretch.

Species Accounts

COMMON LOON: 1 in winter plumage at Alligator Point (Franklin Co.) on 23 Jun (DM1), somewhat late.

NORTHERN GANNET: immature at St. George Island (Franklin Co.) on 14 Jun (DM1), fairly late for area.

BROWN PELICAN: 550(!) on Apalachicola River spoil banks (Franklin Co.) on 3 Jul (DM1), large non-breeding aggregation for area.

WHITE PELICAN: scattered reports throughout period: high count of 86 at phosphate mines (Polk Co.) on 2 Jun (PF1); 43 at mines as late as 14 Jul (PF1, DF1); 48 at Merritt Island NWR on 29 Jun (DC3); 10 at St. Marks NWR on 19 Jul (CG2); 200± at Hickory Mound Impoundment (Taylor Co.) on 26 Jun (JC1), but only 60± on 26 Aug (JC3, KN1).

MAGNIFICENT FRIGATEBIRD: 200+ at Boca Grande Pass (Lee Co.) on 7 Jun (CF1, DF1), likely associated with new breeding colony off Ft. Myers; 3 reports along Big Bend coast with as many as 3 seen on 6 and 10 Jul (CG2, MB1, DM2); 50+ off Key West on 6 Aug (JO1).

MASKED BOOBY: 1 seen 25 miles off Port Canaveral on 10 Jun (DC4, m. obs.), rarely seen.

LEAST BITTERN: 1 at Wakulla Springs SP from early May through 27 Jul (DB3) was new for park.

REDDISH EGRET: 2 regular through Jun and Jul (DM1) at Lanark Reef (Franklin Co.); 1-2 immatures intermittently at St. Marks NWR from 14 Jun to end of period (CG2, RW2); 6 (2 adults, 4 immatures) at Hickory Mound Impoundment (Taylor Co.) on Aug 26 (JC3, KN1) and present through early Sep (JC1). Breeding attempt seems imminent along Big Bend coast.

GLOSSY IBIS: 423 (!) successful nests at Merritt Island NWR (DC3).

GREAT BLUE HERON, White Morph: 1 on coast of northern St. Johns Co. on 18 Aug (CH1); 1 at Alligator Point (Franklin Co.) for most of the report period (GS1).

BLACK-CROWNED NIGHT-HERON: increased numbers reported at St. Marks NWR (RW2); 12 adults, 2 sub-adults at Fiddlers Point (Wakulla Co.) on 23 Jun (DM1) suggest continued breeding nearby; 13 successful nests at Merritt Island NWR (DC3).

ROSEATE SPOONBILL: 1 at Alligator Lake (Columbia Co.) on 24 Jul represents a very rare interior sighting for north Florida (PS3, KG1); ca. 13 at phosphate mines (Polk Co., m. obs.) and 2 north of Interstate 4 (Polk Co.) throughout period (MR1), highest numbers ever for Polk Co.; 60 at Merritt Island NWR on 11 Aug (PF1, DF1) with 6 successful nests (DC3); immature at Carrabelle Beach (Franklin Co.) on 3 Jun (DM1), immature at St. Marks NWR throughout summer (m. obs.), and immature at Hickory Mounds Impoundment (Taylor Co.) on 4 Aug (DS1) were rare northern Gulf coast sightings.

WOOD STORK: high count of 60± at St. Marks NWR on 15 Jun (CG2); 4 seen in northern Okaloosa Co. on 3 Sep (SD1), rare in northwestern panhandle.

BLACK-BELLIED WHISTLING-DUCK: females with broods at phosphate mines in Hardee Co. on 31 Aug (LM2, TP1), first confirmed nesting in area; adults reported in reclaimed wetlands in Polk Co. all summer (SP1).

FULVOUS WHISTLING-DUCK: 10 at St. Marks NWR until late Jun with 3 remaining through end of period (CG1, DS1); 12 in Pensacola on 9 Jun (AF1); 38 at Crew's Lake (Pasco Co.) in early Jun (BP1, PY1, DR2).

BLUE-WINGED TEAL: female with 3 ducklings at Zellwood (Orange Co.) on 18 Aug (PF1, m.obs.), irregular nester; 2-3 from 2 Jun to 14 Jul at phosphate mines (Polk Co.), unusual in summer (PF1, DF1).

NORTHERN SHOVELER: 1 at phosphate mines (Polk Co.) on 2 and 9 Jun (PF1), late to leave.

RING-NECKED DUCK: pair at Crew's Lake (Pasco Co.) until early Jun when male left; female remained until mid Jul (BP1, DR2). Late group of 4 at phosphate mines (Polk Co.) on 2 Jun (PF1).

RED-BREASTED MERGANSER: DF1 and CF1 report 1 at Ft. Myers Beach on 8 Jun; 2 at Ft. DeSoto Park (Pinellas Co.) on 11 Jun; 2 at St. Marks NWR on 13 Jun; 1 at Merritt Island NWR on 24 Jun; and 1 in lower Keys on 26 Jun.

RUDDY DUCK: 5 at phosphate mines (Polk Co.) on 2 Jun (PF1), unusual in summer though a rare nester.

OSPREY: fledgling production at St. Marks NWR was up to 0.98 young per nest versus an alarmingly low 0.11 last year (JR4); 55 flying (mostly adults) at Lake Disston (Volusia Co.) on 17 Jun (HS1) may indicate a breeding aggregation in area.

AMERICAN SWALLOW-TAILED KITE: KM1 reports moderately successful reproduction this year. Fledgling rates of 16 monitored nests were ca. 50% as compared with 39% in 1988 and 81% in 1989. Few nests were found south of Lake Okeechobee, perhaps a result of drought conditions. The Corkscrew Swamp (Lee Co.) roost peaked at 317; the Okeechobee roost (Glades Co.) peaked around 25 Jul with 600-1000 (!). Four over south Jacksonville on 6 Jul (JC2) were uncommon for the area.

BLACK-SHOULDERED KITE: 2 nesting at Broward/Palm Beach Co. line on 9 Jul (DF1, CF1); 1 fledged 4 young (fide JB1); another nest fledged 3 young west of U.S. 27 near Sawgrass Fish Camp (JB1).

SNAIL KITE: sightings shifted north as a result of drought: Big Lake Tohopekaglia (Osceola Co.) had 87 birds, East Lake Tohopekaglia had 10 birds, and Lake Kissimmee (Polk Co.) had 72 birds. Most successful nesting limited to Lake Kissimmee where 58 nests were found (JR3); 2 nests on former phosphate lands near Lehigh Acres (Lee Co.) fledged young; nesting attempts along the lower St. Johns River failed. No nesting in Water Conservation Areas and fewer nest starts than usual at Lake Okeechobee (JR3). Single bird on Conservation Area 2A on 1 Aug (JB1) was only record for Everglades. Several sightings from other central Florida lakes.

MISSISSIPPI KITE: first confirmed nesting for Ocala NF and Marion Co. on 11 Jun (JS4, m. obs.).

COOPER'S HAWK: several reports for this secretive breeding species from around the state (m. obs.) lead to speculation that its numbers are increasing.

SHORT-TAILED HAWK: 3 sightings from Dixie Co.: 1 in Jena WMA on 6 Jun (BM2); 1 in California Swamp on 10 Jun (JC3, KN1); another at Jena WMA on 6 Jul (JR5, SR1).

WILD TURKEY: a female/immature tried "city life" for a while along heavily trafficked road near Bay Point (Bay Co.). The bird was first seen on 13 Jul and stayed in a woodlot across from a golf course for about 5 days (TM1, m. obs.).

BLACK RAIL: 2 called along Palm Beach/Broward Co. line on 30 Aug (JB1).

SANDHILL CRANE: 4 in extreme western Broward Co. on 27 Jun (JB1) may represent breeding attempts in new area.

PIPING PLOVER: 1 at St. George Island on 17 Jul (DM1) was early.

SEMIPALMATED PLOVER: high count of 18 at Alligator Point (Franklin Co.) on 6 Jul (DM1); 12 at phosphate mines (Polk Co., PF1) on 9 Jun.

BLACK-BELLIED PLOVER: 1 in basic plumage in central Broward Co. on 11 Jun (JB1), probably late to leave; 1 in alternate plumage in Franklin Co. on 10 Jul (HS1, DM1), probably a returning migrant.

LESSER GOLDEN PLOVER: 1 in alternate plumage south of South Bay (Palm Beach Co.) on 25 Aug (DF1, CF1), infrequent migrant.

BLACK-NECKED STILT: 6 at Crew's Lake (Pasco Co.) on 6 Jun, disappeared the next day (PY1, DR2).

AMERICAN AVOCET: 2 in alternate plumage at phosphate mines (Polk Co.) on 2 Jun (PF1) seemed late; 3 in Homeland (Polk Co.) on 30 Aug (BC2, LC2) were early.

WILLET: fairly large aggregation of 185 at Lanark Reef (Franklin Co.) on 10 Jul (HS1, DM1).

UPLAND SANDPIPER: 11 south of South Bay (Palm Beach Co.) on 25 Aug (DF1, CF1), good number.

LONG-BILLED CURLEW: 1 on Shell Island (Bay Co.) on 26 Aug (JO2, LO1).

MARBLED GODWIT: high count of 105 at Lanark Reef (Franklin Co.) on 10 Jul (HS1, DM1) with at least 30 present through summer.

Red Knot: 80-130 at Alligator Point throughout Jun-Jul (DM1), large numbers for summer.

White-rumped Sandpiper: high count of 12 (!) at phosphate mines (Polk Co.) on 2 Jun (PF1); 1 at Hickory Mound Impoundment (Taylor Co.) on 10 Jun (DM1).

Pectoral Sandpiper: 35 at sewage treatment ponds south of Tallahassee on 14 Jul (DM1, RW1), good concentration.

Dunlin: 2 at Lanark Reef (Franklin Co.) on 10 Jul (HS1, DM1), 1 in alternate plumage.

Stilt Sandpiper: leucistic bird at Zellwood farms (Orange Co.) from 18-25 Aug (MB2, m. obs.); was it seen anywhere else during migration?

Short-billed Dowitcher: 150± at Lanark Reef (Franklin Co.) on 1 and 16 Jul (DM1), high summer counts for area.

Long-billed Dowitcher: 1 in alternate plumage at St. Marks NWR on 14 Jul (NW1), heard calling in flight.

American Woodcock: several late summer reports around Tallahassee: 1 in southwest portion of town on 29 Jun (DB3); 3 at a small city park on 25 Aug (JC3).

Common Snipe: 1 at River Ranch (Polk Co.) on 30 Aug was very early (BC2).

Laughing Gull: 4000+ adults and juveniles roosted at Lanark Reef on 17 Jul (DM1, RW1), site of only nesting colony in Franklin Co. The colony has grown to ca. 400 nests and appears to be so large as to inhibit nesting by Least Terns and Black Skimmers. Some of the gulls likely moved from St. Marks NWR as reduced numbers were reported there (CG2). In addition, 1 on nest and 1 feeding a downy juvenile at Wards Bank (Duval Co.) on 2 Jul (LB1), rare nesting report for area.

Gull Species: a confusing gull, which may be a Western, Lesser Black-backed, or hybrid gull, appeared (again) along the Pensacola waterfront on 30 Aug; known locally as "old one foot," the gull is estimated to be 16 years old (RD1).

Terns: aerial surveys along the Gulf coast from Homosassa (Citrus Co.) to Steinhatchee (Taylor Co.) found no colonies of terns or skimmers (JR3).

Gull-billed Tern: 4 nests and 5 downy young at Hillsborough Co. phosphate mine (PF1, BC2) are first inland nesting records for region; 2 at St. Marks NWR on 11 Jul (HH1) were uncommon.

Sandwich Tern: 45 at Apalachicola Bay spoil bank (Franklin Co.) on 3 Jul and 60 at Lanark Reef (Franklin Co.) on 17 Jul (DM1), large non-breeding aggregations.

Forster's Tern: 500 roosted at Lanark Reef (Franklin Co.) on 17 Jul (DM1), high number.

Common Tern: 1 at St. Marks NWR on 12 Jul (NW1), first fall report.

Least Tern: North Florida: colony along St. George Island causeway (Franklin Co.) has grown from 150 to about 700+ pairs. Colony benefitted from habitat improvement, site posting, and educational brochures. Least tern colony at St. Marks NWR grew to 13 pairs and fledged 15 chicks (JR4) from specially constructed platforms. At least 6 small colonies produced young in Duval and St. Johns Counties, the largest being Wards Bank (Duval Co.) and Matanzas National Monument (St. Johns Co.) with 40± active nests each (LB1, PP1). South Florida: colony of 300+ nested (DS3) on a building in Lake Wales; 646 (!) at phosphate mines (Polk Co.) on 14 Jul (PF1, DF1) for record high count, but nesting in area limited to a small colony; 2 small colonies found on Merritt Island NWR on 20 Jun (DS2); 13 nesting colonies found in Broward Co. with 9 on rooftops and 4 at construction sites (JB1).

Bridled Tern: 1 seen 25 miles off Port Canaveral (DC4, m. obs.) on 10 Jun, rarely reported.

Black Tern: high count of 1,650 (!) at phosphate mines (Polk Co.) on 26 Aug (PF1); 175 roosting on Lanark Reef (Franklin Co.) on 1 Jul (DM1).

Black Skimmer: 820 reported at phosphate mines (Polk Co.) on 26 Aug (PF1), second highest interior count; 204 pairs nested on St. George Island causeway (see Least Tern).

WHITE-WINGED DOVE: 1 seen along Broward/Collier Co. line (JB1) on 29 Jun, new for area.

EURASIAN COLLARED-DOVE: careful observation of 1 at St. Marks NWR on 10 Jun (DJ1, SJ3), few reports for area.

PSITTACINES: 2 *Amazona* spp. in Pensacola on 3 Aug were subsequently seen on several occasions (AF1); they were joined by 2 *Aratinga* spp. on 17 Aug.

CHUCK-WILL'S-WIDOW: first migrant at Key West reported on 8 Aug (JO1).

BELTED KINGFISHER: 1 at Lake Alfred (Polk Co.) on 14 Jun (PT2) was unusual, even though 1 nesting record for area; 1 at Merritt Island NWR on 6 Jul was rare (KB1, MH3); 1 in western Broward Co. on 25 Jul (JB1) and 1 at Key West on 30 Jul (JO1) were first "fall" reports for south Florida.

RED-COCKADED WOODPECKER: a random sample of 50 of 186 colonies classified as active in 1989 by the U.S. Forest Service was re-sampled by FJ1, RW1, and others. They found 13 inactive, 14 with single birds, and 23 with breeding pairs/clans. The U.S. Forest Service re-visited areas that had not been studied since 1981 and found 8 active colonies not included in their 1989 inventory of active colonies (R. Costa and co-workers). The area studied by both groups contains about 30% of the active colonies in the Apalachicola National Forest.

WOODPECKER: while conducting a BBS in Levy Co., JC3 had 6 species of woodpeckers calling at 1 3-minute census station (sans red-cockaded)!

EASTERN KINGBIRD: an interesting recent phenomenon is nesting on metal power poles and transmission substations on former phosphate mines in Polk Co. (PF1, LC2); large flock of 500+ near Avon Park Bombing Range (Polk Co.) on 28 Aug (DF1, CF1).

GRAY KINGBIRD: 13 pairs on Alligator Point (Franklin Co.) on 16-17 Jul (DM1), possibly more common in area than suspected.

EASTERN WOOD-PEWEE: pair near Ocala on 8 Jun (JS4, WB1), nesting south of approximately Gainesville is rare.

EASTERN PHOEBE: a late Jul nest at bridge near Laurel Hill (Okaloosa Co.) where first state record found (DW1).

PURPLE MARTIN: roost of 1500-1800 at St. Marks NWR on 28 Jul (CG2); roosts of a few score began collecting around Key West ca. 30 Jul and increased to 1000+ by 29 Aug.

BARN SWALLOW: first nest recorded in Highlands Co. on 6 Jun (FL1, MS2); 2 adults in Okeechobee Co. on 6 Jun (GM2); 6 juveniles, 2 adults at Key West on 3 Jun (JO1).

BLUE-GRAY GNATCATCHER: 1st nest at Archbold Biological Station on 5 Jun (RM1).

EASTERN BLUEBIRD: young hatched from a late nest near High Springs (Alachua Co.) on 8 Aug and fed through end of Aug (MA1).

AMERICAN ROBIN: 1 sang from late Apr through 9 Jul in Gainesville (GK1); 1 at Mexico Beach (Bay Co.) on 9 Jun (m. obs.) was late.

BLUE-WINGED WARBLER: 1 near Wakulla River (Wakulla Co.) on 24 Aug was early (JC1).

GOLDEN-WINGED WARBLER: 1 near Wakulla River (Wakulla Co.) on 24 Aug also somewhat early (JC1).

YELLOW WARBLER: 1 at St. Marks NWR on 12 Jul (NW1) and 1 in western Broward Co. on 28 Jul (JB1) were earliest reports.

CHESTNUT-SIDED WARBLER: 1 in rural Alachua Co. on 21 Aug (JH2) and 1 at Saddle Creek Park (Polk Co.) on 26 Aug (PT2) were early.

CAPE MAY WARBLER: 1 in western Broward Co. on 28 Jul was very early (JB1).

PRAIRIE WARBLER: early stages of commercial pine plantations may be helping this species extend its range; recorded in new areas of northern Wakulla Co. (HS1) and northwestern Taylor Co. (JC3) at several times in early Jun.

PALM WARBLER: early migrant at Myakka SP on 24 Aug (BC2, LC2).

PROTHONOTARY WARBLER: early migrant near Venus (Highlands Co.) on 12 Jul (DS4); 11 at Saddle Creek Park (Polk Co.) on 21 Jul (PF1).

SWAINSON'S WARBLER: 1 at San Felasco Hammock State Preserve (Alachua Co.) on 31 Aug (RR1); rarely seen here.

KENTUCKY WARBLER: adult with juvenile in southern Suwannee Co. on 27 Jul (BP1) was far east of published breeding range.

HOODED WARBLER: first confirmed breeding for Levy Co. on Lower Suwannee River NWR on 4 Jul (m. obs.).

YELLOW-BREASTED CHAT: adults with fledglings ca. 10 miles south of Chiefland (Levy Co.) on 4 Jul (DH2, DF3), first confirmed nesting for Co.

ROSE-BREASTED GROSBEAK: 1 at Saddle Creek Park (Polk Co.) on 25 Aug (PF1) was early.

BLUE GROSBEAK: several southerly breeding season records: 5 singing males in Highlands and Okeechobee Cos. (BK1, MK1, GM2, DS4) from Jun-Jul; 8 males and 1 female in Brevard and Volusia Cos. on 13, 15 Jun (DS2); 5 birds at Zellwood (Orange Co.) on 4 Aug (DF1, CF1, PF1); 2 pairs in northeastern Pinellas Co. on 16 Jun (LH1).

PAINTED BUNTING: 1 singing male 5 miles southwest of Ocala on 28 Jun (JS4); 9 singing males at Merritt Island NWR on 13 and 15 Jun (DS2); 2 males at Panama City on 30 Jun, 1 begging for food (RI1, AI1, m. obs.); male at St. Marks NWR on 2 Jul (BJ1), an early migrant or pioneer.

INDIGO BUNTING: late migrants or possible breeders include: 1 singing male at old channel of Kissimmee River (Highlands Co.) on 6 Jun (FL1, GM2, MS2); 7 singing males at Merritt Island NWR on 12, 15 Jun (DS2); 6 at Zellwood (Orange Co.) on 4 Aug (PF1, DF1, CF1).

FIELD SPARROW: singing male near Trenton on 8 and 20 Jun (Gilchrist Co.) was somewhat south (DM3, BM2, RC2).

BOBOLINK: very late migrant at Merritt Island NWR on 15 Jun (DS2).

NORTHERN ORIOLE: 1 at Key West on 9 Aug (JO1) was first of the season.

SHINY COWBIRD: male at Eastpoint (Franklin Co.) on 23 Jun (DM1) and on 10 Jul (DM1, HS1); 10-12 regular now west of Apalachicola (RW1, HS1, DM1); common throughout period at Key West (JO1); pair at feeder (JB1) in Cooper City (Broward Co.).

BROWN-HEADED COWBIRD: female at Key West on 20 Aug (JO1) was first of fall season.

HOUSE FINCH: fledged young in Pensacola on 15 Jun (AF1); fledglings found at several locations around Tallahassee (m. obs.).

Observer abbreviations: Adams, Mary (MA1), Bryan, Dana (DB3), Baker, Jocie (JB1), Bennet, Ken (KB1), Bremer, Linda (LB1), Brothers, Michael (MB1), Biggs, Wes (WB1), Cooper, Buck (BC2), Cooley, Dwight (DC3), Click, Dan (DC4), Cavanagh, Jim (JC1), Cocke, Julie (JC2), Cox, James (JC3), Cooper, Linda (LC2), Duncan, Robert A. (RD1), Duncan, Scot (SD1), Forster, Ann (AF1), Ford, Clarice (CF1), Ford, Don (DF1), Fagan, Dorothy (DF3), Fellers, Paul J. (PF1), Geanangel, Chuck (CG1), Gidden, C.S. (CG2), Greenberg, Katie (KG1), Hough, C. Royce (CH1), Hill, Hugh (HH1), Hintermister, John (JH2), Hopkins, Larry (LH1), Harrel, Mary (MH3), Ingram, Ann (AI1), Ingram, Richard (RI1), Jordan, Blannie (BJ1), Jue, Dean (DJ1), James, Fran (FJ1), Jue, Sally (SJ3), Kittredge, Bruce (BK1), Kiltie, Gracie (GK1), Kittredge, Marion (MK1), Lohrer, Fred (FL1), Millsap, Brian (BM2) McNair, Doug (DM1), Mehlman, David (DM2), Miller, Dorothy (DM3), Myers, Ken (KM1), Menart, Tony (TM1), NeSmith, Katy (KN1), Ondrejko, Joe (JO1), Oswald, Joe (JO2), Oswald, Lois (LO1), Pranty, Bill (BP1), Powell, Peggy (PP1), Robinson, Don (DR2), Rodgers, Jim (JR3), Reinman, Joe (JR4), Rogers, John (JR5), Rowan, Rex (RR1), Rogers, Steve (SR1), Sandee, Daan (DS1), Simpson, David (DS2), Seamon, Greg (GS1), Stevenson, Henry (HS1), Sharpe, John (JS4), Stapleton, Martin (MS2), Southall, Pete (PS3), Timmer, Pete (PT2), Young, Paul (PY1), Ware, Don (DW1), Wamer, Noel (NW1), West, Rick (RW1), Will, Robin (RW2).

REPORT

Florida Field Naturalist 19(1): 31, 1991.

Summary of the 1990 Fall Meeting.—The fall 1990 meeting of the Florida Ornithological Society was held at the Holiday Inn on Apalachee Parkway in Tallahassee, Florida, from 12-14 October. Tall Timbers Research Station was the host "chapter" and was assisted by Apalachee Audubon Society. Todd Engstrom was the local committee chair.

During the board meeting, Dr. Peter Merritt was appointed Editor of the *Florida Field Naturalist.* Retiring editor James Rodgers was appointed to the Editorial Advisory Board. Jocie Baker and Dr. William Robertson were appointed to three-year terms on the Records Committee. It was voted to proceed with immediate publication of an updated index to Florida bird records in *American Birds* prepared by Glen and Jan Woolfenden and Robert Loftin. A companion index to West Indian bird records and the FOS checklist are being investigated for publication in 1991. A committee to investigate hotlines and the participation by FOS was appointed.

The Saturday afternoon paper session was presented by Florida Game and Fresh Water Fish Commission and moderated by Dr. Charlie Chase of Florida State University. Papers were given by Doug Runde on "State-wide survey of wading bird colonies"; Jeff Gore on "Roof-nesting Least Terns in northwest Florida"; Stephen Nesbitt on "Sandhill Crane studies as a prelude to the reintroduction of the Whooping Crane in Florida"; Charlie Chase on "Snowy Plover: a worst case scenario"; and Brian Millsap on assigning priorities for nongame species.

The skin quiz was prepared by Jim Cox of FGFWFC and Katie NeSmith of the Florida Natural Areas Inventory. In addition to skins, it required participants to identify bird calls, identify the location of vagrants recorded in Florida, and match prominent early ornithologists with their works. Bill Pranty got the most correct answers and won a set of tapes of warbler calls. Paul Sykes came in second.

Field trips were held to Wakulla Beach, St. Marks National Wildlife Refuge, Tall Timbers, and Alligator Point. The banquet was a barbeque at Tall Timbers Research Station. There was no banquet speaker. After dinner, Wes Biggs presented Ray Harms prints to several outstanding coordinators in the Breeding Bird Atlas project. Barbara Muschlitz was recognized for her work in 1989 in Gilchrist and Union Counties and for assistance in keypunching of data. For 1990, Peggy Powell was recognized for her work in north Florida and Mickey Wheeler was recognized for her efforts in south Florida. Tours of the station buildings were provided after the meal. The usual good time was had by all.

Future meetings are: 19-21 April 1991 near Ruskin, 4-6 October 1991 in Jacksonville, and 9-12 April 1992 with the Wilson Ornithological Society in Kissimmee.—**Bruce Neville,** Secretary, 3757 Maria Circle, Tallahassee, Florida 32303.

ANNOUNCEMENT

TIOF Endowment Fund Proposal.—The International Osprey Foundation (TIOF) is seeking applications for its second grant to support research activities of a graduate student primarily focusing on Ospreys. Work with other raptor species may be considered, however. The award recipient will be expected to provide a report on his or her research and use funds within a year of receiving the grant.

Gustavo D. Danemann, a graduate student with the Seabird Program at the Universidad Autonoma de Baja California Sur, Marina Biology Department in La Paz, Mexico, was awarded the first grant. He is studying the breeding ecology, philopatry and dispersion of Ospreys in the coastal lagoons of Baja California and the effect of nest density on breeding performance.

Applicants should submit a proposal outlining their project and the intended use of the funds by April 15, 1991. The grant will be awarded on June 1, 1991. Send applications to: TIOF, Endowment Fund, P.O. Box 250, Sanibel, Florida 33957-0250, USA.

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INFORMATION FOR CONTRIBUTORS

The Florida Field Naturalist is a fully refereed journal emphasizing biological field studies and observations of vertebrates, especially birds, in and near Florida and the nearby West Indies. It welcomes submission of manuscripts containing new information from these areas. Please consult recent issues for style, and Vol. 18, No. 1 for detailed information. Submit manuscripts for consideration to the editor Peter G. Merritt. Monograph-length manuscripts may be submitted for consideration to the Editor of Special Publications John William Hardy. Send books and other materials for review to Associate Editor Sheila A. Mahoney. Send copies of recent literature on Florida birds to Special Editor Fred E. Lohrer. For preliminary assistance regarding submission of manuscripts dealing with bird distribution and rarities contact Associate Editor Howard P. Langridge. Reports of rare birds in Florida should also be submitted to the FOS Records Committee Secretary Jocie Baker. For preliminary assistance regarding submission of scientific, technical, or behavioral contributions contact Associate Editor Richard T. Paul.

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FLORIDA ORNITHOLOGICAL SOCIETY
FOUNDED 1972

All persons interested in Florida's natural history, particularly its abundant bird life, are invited to join the Florida Ornithological Society **by writing the Treasurer**. Annual membership dues are $15 for individual members (overseas $20), $20 for a family membership, $10 for students, and $35 for contributing members.

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AVIAN COMMUNITY DYNAMICS IN A PENINSULAR FLORIDA LONGLEAF PINE FOREST

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Abstract.—The bird community of a mature longleaf pine (*Pinus palustris*) forest in central Florida was studied seasonally over a four-year period. Seventy-seven species were observed on the study area, with the highest seasonal average (36) in the spring. Permanent residents represented the majority of species (about 70%) and individuals (about 80%) in all seasons. Bird density (562/km^2) and biomass (29.2 kg/km^2) in summer were more than twice those of the winter. Insectivores were the dominant trophic group in all seasons except fall, when omnivores were most common. Virtually all seasonal turnover occurred within the insectivore group. The longleaf pine community supported more birds and bird species in summer than in winter, suggesting that natural longleaf pine forests do not serve as major wintering areas for migrants. In this respect they are very different from southern bottomland forests and certain other pine forests.

A continental gradient of decreasing breeding bird species richness from northwest to southeast continuing down the Florida peninsula seems well established (MacArthur and Wilson 1967, Cook 1969, Robertson and Kushlan 1974). This gradient is counter to the conventional increase in diversity with decreasing latitude. Tramer (1974) and Rabenold (1979) have focused attention on this reverse latitudinal diversity gradient, which is observed to start with a "tropical threshold" at about 25° in Florida and proceed north to 45-50° N in New England. However, several complications to the above generality exist. Short (1979) presented the case that "within-habitat" species richness (alpha diversity) does not follow the same pattern, and Wiens (1975: 228) observed that, "mature northeastern forests, southeastern pine forests, and forests in the Sierra Nevada of California all support relatively large numbers of breeding species."

Whereas a gradient may exist for breeding birds, the same gradient clearly does not apply to wintering birds, at least not in certain habitats (Dickson 1978, Hirth and Marion 1979, Harris and Vickers 1984). Neither does the gradient apply to non-passerine breeding land birds (Robertson and Kushlan 1974). A multi-season study of bird community dynamics in a low-latitude North American setting would help to shed light on these issues.

Of equal relevance to the gradient issue is whether the data considered in analyses are derived from natural or secondary habitats. Open-spaced longleaf pine (*Pinus palustris*) originally dominated some 24 million hectares, over 60% of the southeastern coastal plain (Croker 1979, Ware et al. in press). Yet, only one thorough, multi-seasonal study of this vegetation type has been reported (Repenning and Labisky 1985). Norris (1951) described qualitative characteristics of the summer avifauna but established no quantitative reference point. Harris et al. (1974) compared seasonal abundance and richness in young pine plantations to a mature longleaf control stand, but no emphasis was given to community characteristics. Engstrom (1981) reported on data collected in a small (58 ha), mature longleaf stand in southern Georgia. Only Repenning and Labisky (1985), working in the Florida Panhandle, have provided data on birds from large natural longleaf pine stands.

The objective of our study was to establish the nature of seasonal avian community dynamics in a natural longleaf pine forest of the deep southeastern coastal plain. With a second reference point from a natural forest community and one nearer the "tropical threshold," greater significance can be attached to more northern studies and to those in managed and/or second-growth forests.

Study Area

This study was conducted on a 162 ha tract of mature longleaf pine 10 km north of Brooksville, Hernando County, Florida at 28° N (Fig. 1). Although many of the trees were "turpentined" early in this century, the stand is believed to be the only sizeable tract of old-growth "virgin" pine in Florida. The forest was subjected to controlled burning and cattle grazing until 1960, when cattle were fenced out and fire was excluded (Beckwith 1967). In 1977 winter burning was reintroduced. Because of the 17-year period without fire, a hardwood midstory and brushy understory proliferated. In this respect the study area differed from a "natural" longleaf pine stand, which would have had little or no midstory.

The dominant trees on the study area were mature longleaf pines (dbh $\bar{x} \pm$ SD = 26.1 $\pm$ 11.8 cm; density $\bar{x} \pm$ SD = 194.6 $\pm$ 52.6/ha), water oak (*Quercus nigra*) (dbh $\bar{x} \pm$ SD = 16.8 $\pm$ 5.6 cm; density $\bar{x} \pm$ SD = 25.2 $\pm$ 23.8/ha) and laurel oak (*Q. hemisphaerica*) (dbh $\bar{x} \pm$ SD = 19.1 $\pm$ 8.1 cm; density $\bar{x} \pm$ SD = 9.2 $\pm$ 5.5/ha); the oaks are fast-growing invaders (Table 1). That the latter two species also were the most important midstory species, and ranked second and third as understory species, portrays the speed with which these hardwoods become established in the absence of fire. The dominant understory shrub was runner oak (*Q. pumila*). Wire grasses (*Aristida* spp. and *Sporobolus* spp.) were the most prevalent herbaceous species, constituting 27.8% of the ground cover.

METHODS

The bird population on the study area was estimated by walking the center line of 20 x 500 m (1 ha) quadrats, a fixed-width transect technique (Type D in Emlen 1971). Five east-west quadrats were randomly chosen on the study area with the only constraint that they be a minimum of 100 m apart. Because of a dense hardwood midstory, narrow transects were specifically chosen to reduce the seasonal bias inherent in all bird population estimates in which breeding season data are compared with non-breeding season data.

Birds were counted during four seasonal sampling periods each year from February 1976 to June 1979. Sampling periods were as follows: winter, Feb. 12 to Feb. 27; spring, Mar. 26 to Apr. 30; summer, June 1 to July 16; fall, Oct. 17 to Oct. 27. During each sampling period, quadrats were counted on four or five usually consecutive days starting about 0.5 hr after sunrise. It took about 2 hrs to count all five quadrats with quadrats being covered in a different sequence each day to reduce temporal bias. All birds seen or heard were recorded, but only those within 10 m of the center line were noted as on the quadrat. Estimates of avian biomass were based on data from specimens in the Florida Museum of Natural History collection and information from J. B. Dunning, Jr. (pers. comm.).

We calculated avian species diversity in two ways. Both were measures of alpha diversity (Whittaker 1960). The first was derived from just those birds that occurred directly on quadrats, whereas the second was derived from the frequencies of all birds seen or heard while walking the transects.

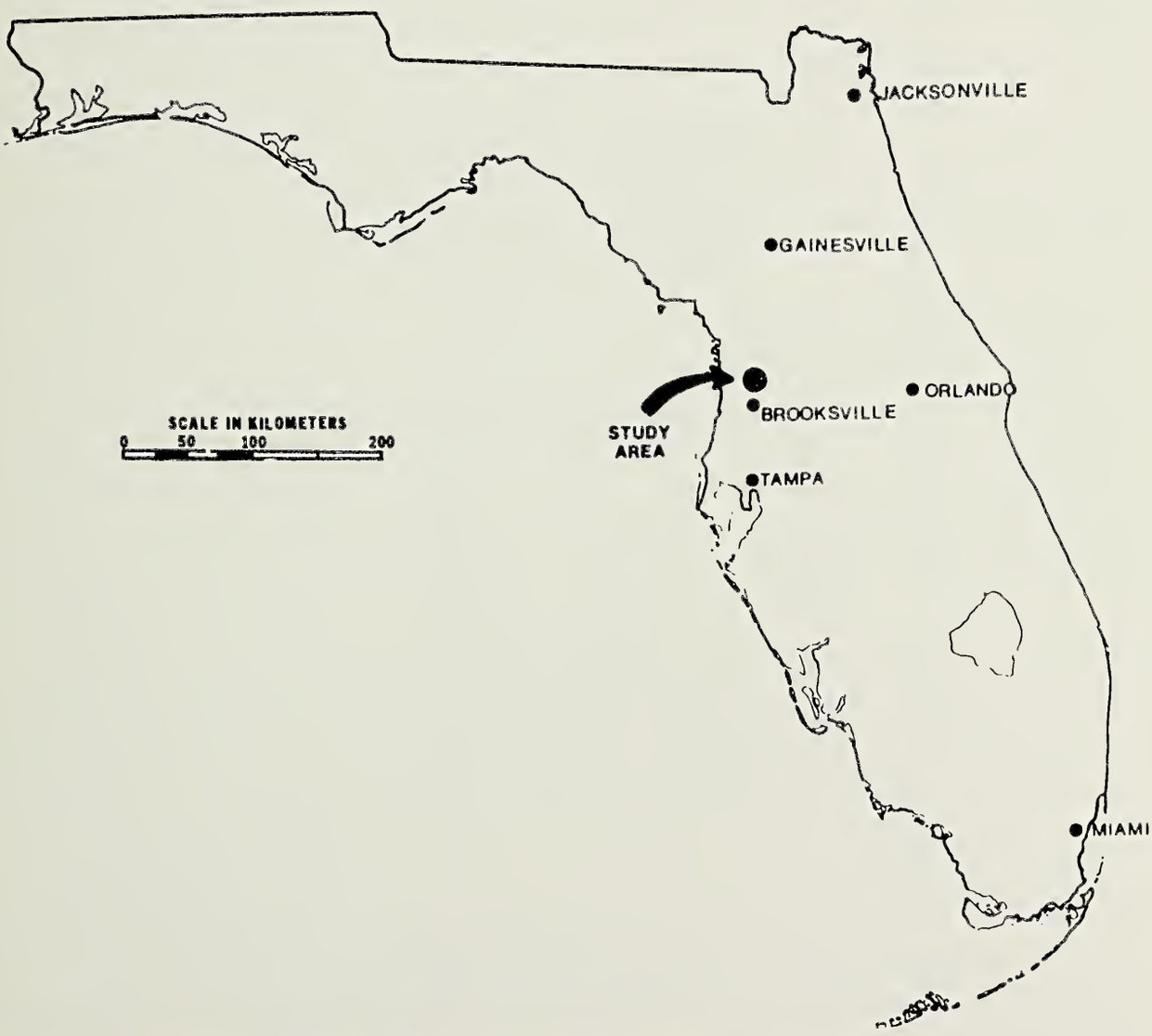

Figure 1. Location of study area in Hernando County, Florida.

Table 1. Percent cover of the 10 most important woody species in 3 strata. Note that only nine species occurred in the canopy stratum.

	Understory 0-2 m		Midstory 2-8 m		Canopy > 8 m	
Rank 1	*Quercus pumila*	(4.6)	*Quercus nigra*	(12.9)	*Pinus palustris*	(37.5)
Rank 2	*Q. nigra*	(4.1)	*Q. hemisphaerica*	(12.2)	*Quercus nigra*	(4.1)
Rank 3	*Q. hemisphaerica*	(2.5)	*Q. margaretta*	(9.1)	*Q. hemisphaerica*	(4.0)
Rank 4	*Myrica cerifera*	(2.4)	*Pinus palustris*	(6.4)	*Carya glabra*	(1.4)
Rank 5	*Q. margaretta*	(1.9)	*Q. laevis*	(4.8)	*Prunus serotina*	(1.0)
Rank 6	*Smilax* spp.	(1.9)	*Prunus serotina*	(2.1)	*Q. virginianus*	(0.4)
Rank 7	*Vaccinium arboreum*	(1.1)	*Q. virginianus*	(2.0)	*Liquidambar styraciflua*	(0.4)
Rank 8	*Viburnum dentatum*	(0.9)	*Liquidambar styraciflua*	(1.9)	*Myrica cerifera*	(0.3)
Rank 9	*Gelsemium sempervirens*	(0.6)	*Carya glabra*	(1.6)	*Magnolia grandiflora*	(0.2)
Rank 10	*Q. laevis*	(0.5)	*Smilax* spp.	(1.3)	—	
Total		20.5		54.3		49.3
% cover all species		22.5 ± 7.3		58.9 ± 26.4		49.3 ± 8.0

$\bar{x}$ ± SD

To analyze trophic relations of the community, we categorized species as granivores, carnivores (predominantly insectivores), and omnivores. Although assignments to these categories involved some arbitrary decisions because of seasonal shifts in food habits, placment of the great majority of species was straight-forward (Martin et al. 1951, Hamel et al. 1982).

There were two small (< 1 ha) ponds on and adjacent to the study area. Because we were interested in the birds of the longleaf pine community, we have deleted from consideration in this paper those species associated with the aquatic ecosystems. These included Wood Duck (*Aix sponsa*), Anhinga (*Anhinga anhinga*), Wood Stork (*Mycteria americana*), Belted Kingfisher (*Megaceryle alcyon*), and a variety of herons and egrets. Cattle Egrets (*Bubulcus ibis*) passing over from nearby pastures were not considered. Scientific names of other avian species in the text are listed in Table 2 and follow AOU (1983) checklist.

Habitat measurements were taken on a 0.5-ha quadrat located on each of the bird sampling quadrats (50 x 100 m). Density and dbh of trees > 10 cm were tallied by a total quadrat count on the five quadrats. Percent cover and species composition (both woody and herbaceous) were estimated by the line intercept method along three 30 m lines on each quadrat.

RESULTS

There were no significant differences in number of birds seen among the five transects during any season (ANOVA, df = 4, 236, $F = 0.2975$, $P = 0.88$), and thus we pooled the data from all transects for further analysis. A total of 77 species was seen from January 1976 to June 1979 (Table 2). The highest seasonal average of 36 species occurred during spring (total for 4 springs = 53) when both permanent residents and migrants were present, and the lowest seasonal average of 33 species (total = 50 species) was for winter (Table 3).

Permanent residents constituted the majority of species and the majority of individuals on the study area during all seasons (Tables 2 and 3). Of the 77 species seen, 38 were permanent residents, 23 were winter-only residents, 11 were summer-only residents, and 5 were transients. Permanent residents constituted 58% of the species recorded during winter and 68% of the species recorded during summer. The proportion of total individuals contributed by permanent resident species in summer and winter was 82% and 79%, respectively.

Only 45 of the 77 species observed on the study area occurred on the sample quadrats (Table 2). The 17 permanent resident species observed on the quadrats during summer were complemented by 7 summer-only species, whereas 18 permanent resident species observed during winter were complemented by 9 winter-only species. Thus, permanent residents represented about 70% of the total species array during summer and winter. Only five species classified as transients were seen on the study area, and only three of these appeared on our quadrats (Table 2).

The summer bird density (as opposed to breeding bird density) was more than twice the winter bird density (Table 3). The density of individuals in species classified as permanent residents more than doubled

Table 2. Mean density (± SD), residency status, and foraging groups of birds occurring on the study area, Hernando County, Florida, February 1976 to June 1979.

Species	Residency status*	Foraging group**	Density (birds/km²)***			
			Win.	Spr.	Sum.	Fall
Black Vulture *Coragyps atratus*	P	C	x	x	x	x
Turkey Vulture *Cathartes aura*	P	C	x	x	x	x
Sharp-shinned Hawk *Accipiter striatus*	W	C	—	—	—	3.3 (26.0)
Cooper's Hawk *Accipiter cooperii*	P	C	—	—	—	x
Red-shouldered Hawk *Buteo lineatus*	P	C	x	x	x	x
Red-tailed Hawk *Buteo jamaicensis*	P	C	x	x	x	—
American Kestrel *Falco sparverius*	P	C	—	—	—	x
Northern Bobwhite *Colinus virginianus*	P	G	37.7 (155.5)	18.8 (98.7)	63.3 (259.0)	48.3 (202.1)
American Woodcock *Scolopax minor*	W	C	1.6 (12.9)	—	—	—
Mourning Dove *Zenaida macroura*	P	G	x	1.3 (11.3)	4.4 (26.0)	x
Common Ground-Dove *Columbina passerina*	P	G	—	x	x	x
Yellow-billed Cuckoo *Coccyzus americanus*	S	I	—	x	x	x
Eastern Screech Owl *Otus asio*	P	C	—	—	—	x
Great Horned Owl *Bubo virginianus*	P	C	x	—	—	x
Barred Owl *Strix varia*	P	C	1.6 (12.9)	—	x	1.7 (13.0)
Chuck-will's-widow *Caprimulgus carolinensis*	S	I	—	1.3 (11.3)	8.9 (36.7)	—
Whip-poor-will *Caprimulgus vociferus*	W	I	3.3 (18.3)	—	—	—
Chimney Swift *Chaetura pelagica*	S	I	—	—	x	x
Ruby-throated Hummingbird *Archilochus colubris*	S	N	—	1.3 (11.3)	2.2 (15.0)	—
Red-headed Woodpecker *Melanerpes erythrocephalus*	P	I	—	x	—	—
Red-bellied Woodpecker *Melanerpes carolinus*	P	O	4.9 (22.4)	23.8 (65.6)	14.4 (43.7)	10.0 (31.9)
Yellow-bellied Sapsucker *Sphyrapicus varius*	W	O	x	—	—	—

Table 2. (continued)

Species	Residency status*	Foraging group**	Density (birds/km²)*** Win.	Spr.	Sum.	Fall
Downy Woodpecker *Picoides pubescens*	P	I	1.6 (12.9)	3.8 (19.5)	22.2 (58.1)	5.0 (22.5)
Northern Flicker *Colaptes auratus*	P	I	1.6 (12.9)	x	x	1.7 (13.0)
Pileated Woodpecker *Dryocopus pileatus*	P	I	1.6 (12.9)	3.8 (25.2)	7.8 (35.2)	3.3 (18.4)
Eastern Wood Pewee *Contopus virens*	S	I	—	—	—	x
Eastern Phoebe *Sayornis phoebe*	W	I	6.6 (31.6)	—	—	x
Great-crested Flycatcher *Myiarchus crinitus*	S	I	—	31.3 (75.5)	36.7 (95.4)	x
Purple Martin *Progne subis*	S	I	—	x	x	—
Tree Swallow *Tachycineta bicolor*	W	I	x	x	—	x
Barn Swallow *Hirundo rustica*	T	I	—	—	—	x
Blue Jay *Cyanocitta cristata*	P	O	3.3 (31.6)	15.0 (55.1)	27.8 (71.1)	26.7 (68.9)
Fish Crow *Corvus ossifragus*	P	O	1.6 (12.9)	x	x	x
Carolina Chickadee *Parus carolinensis*	P	O	24.6 (61.9)	11.3 (43.6)	26.7 (76.4)	11.7 (43.2)
Tufted Titmouse *Parus bicolor*	P	O	18.0 (67.1)	52.5 (107.9)	85.6 (156.1)	93.3 (209.1)
Red-breasted Nuthatch *Sitta canadensis*	W	I	—	—	—	x
White-breasted Nuthatch *Sitta carolinensis*	P	I	—	x	—	—
Carolina Wren *Thryothorus ludovicianus*	P	I	8.2 (28.9)	17.5 (57.4)	27.8 (84.1)	10.0 (36.8)
House Wren *Troglodytes aedon*	W	I	—	1.3 (11.3)	—	3.3 (26.6)
Golden-crowned Kinglet *Regulus satrapa*	W	I	3.3 (25.8)	—	—	—
Ruby-crowned Kinglet *Regulus calendula*	W	I	23.0 (79.6)	12.5 (45.0)	x	1.7 (13.0)
Blue-gray Gnatcatcher *Polioptila caerulea*	P	I	3.3 (25.8)	43.8 (101.3)	35.6 (88.7)	28.3 (89.3)
Eastern Bluebird *Sialia sialis*	P	I	—	—	—	x
Veery *Catharus fuscescens*	T	I	x	—	—	1.7 (13.0)
Hermit Thrush *Catharus guttatus*	W	I	4.9 (28.9)	5.0 (22.5)	—	—

Table 2. (continued)

Species	Residency status*	Foraging group**	Density (birds/km²)*** Win.	Spr.	Sum.	Fall
Wood Thrush *Hylocichla mustelina*	T	I	—	x	—	1.7 (13.0)
American Robin *Turdus migratorius*	W	O	x	1.3 (11.3)	—	—
Gray Catbird *Dumetella carolinensis*	W	O	x	x	—	15.0 (50.4)
Northern Mockingbird *Mimus polyglottus*	P	O	—	x	x	—
Brown Thrasher *Toxostoma rufum*	P	O	x	x	5.6 (28.0)	1.7 (13.0)
Cedar Waxwing *Bombycilla cedrorum*	W	O	—	x	—	—
White-eyed Vireo *Vireo griseus*	P	I	11.5 (48.3)	10.0 (35.6)	25.6 (84.1)	6.7 (31.9)
Yellow-throated Vireo *Vireo flavifrons*	S	I	—	10.0 (55.1)	7.8 (31.8)	x
Red-eyed Vireo *Vireo olivaceus*	S	I	—	x	6.7 (36.7)	—
Northern Parula *Parula americana*	S	I	—	16.3 (60.6)	13.3 (42.4)	—
Magnolia Warbler *Dendroica magnolia*	T	I	—	—	—	5.0 (29.1)
Yellow-rumped Warbler *Dendroica coronata*	W	I	x	31.3 (148.8)	—	6.7 (52.1)
Black-throated Green Warbler *Dendroica virens*	T	I	x	—	—	—
Yellow-throated Warbler *Dendroica dominica*	P	I	3.3 (18.3)	1.3 (11.3)	—	3.3 (18.4)
Pine Warbler *Dendroica pinus*	P	I	42.6 (108.0)	25.0 (76.3)	54.4 (119.5)	35.0 (115.7)
Prairie Warbler *Dendroica discolor*	P	I	—	x	—	—
Palm Warbler *Dendroica palmarum*	W	I	3.3 (25.8)	1.3 (11.3)	—	1.7 (13.0)
Black and White Warbler *Mniotilta varia*	W	I	3.3 (25.8)	1.3 (11.3)	—	6.7 (31.9)
Ovenbird *Seiurus aurocapillus*	W	I	3.3 (18.3)	5.0 (27.6)	—	—
Common Yellowthroat *Geothlypis trichas*	P	I	1.6 (12.9)	7.5 (35.6)	1.1 (10.6)	6.7 (31.9)
Summer Tanager *Piranga rubra*	S	I	—	6.3 (29.8)	14.4 (43.7)	—
Northern Cardinal *Cardinalis cardinalis*	P	G	21.3 (51.6)	50.0 (88.6)	48.9 (99.4)	26.7 (63.8)

Table 2. (continued)

Species	Residency status*	Foraging group**	Density (birds/km²)***			
			Win.	Spr.	Sum.	Fall
Rufous-sided Towhee *Pipilo erythrophthalmus*	P	G	1.6 (12.9)	13.8 (46.4)	28.9 (70.3)	11.7 (46.9)
White-throated Sparrow *Zonotrichia albicollis*	W	G	x	—	—	—
Dark-eyed Junco *Junco hyemalis*	W	G	x	—	—	—
Red-winged Blackbird *Agelaius phoenicus*	P	O	1.6 (12.9)	x	x	38.3 (221.3)
Eastern Meadowlark *Sturnella magna*	P	I	—	x	—	—
Boat-tailed Grackle *Quiscalus major*	P	O	x	—	x	—
Common Grackle *Quiscalus quiscula*	P	O	x	x	—	x
Brown-headed Cowbird *Molothrus ater*	W	O	—	x	—	—
Pine Siskin *Carduelis pinus*	W	G	x	—	—	—
American Goldfinch *Carduelis tristis*	W	G	x	—	—	—

*Seasonal status designated: P, permanent resident; W, winter resident; S, summer resident; T, transient.
**Foraging group designated: C, carnivorous; I, insectivorous; O, omnivorous; G, granivorous; N, other.
***x denotes bird present on study area during season but not on a quadrat.

from 215/km² in winter to 315/km² in spring and 472/km² during summer sampling periods. The spring increase occurred prior to the nesting season and clearly represented an influx of migrants from farther south. Downy Woodpecker, Tufted Titmouse, Blue Jay, and Carolina Wren were examples of permanent resident species that increased markedly from winter to spring; populations of Pine Warblers and Carolina Chickadees declined during the same period (Table 2). The increase in summer density presumably resulted from production of young.

Summer biomass of the avian community exceeded the winter biomass by the same magnitude (29.2 kg/km² versus 13.6 kg/km²) as summer density exceeded winter density. Biomass of permanent resident species represented 90% of the total avian community during summer, and 91% during winter. Even though the density of Northern Bobwhites was exceeded by Pine Warblers in winter and by Tufted Titmice in summer, large body size caused bobwhites to represent 51% of the avian biomass during winter, and 38% during summer. When we deleted Northern Bobwhites from this analysis, permanent residents were less

Table 3. Mean density (± SD), species number, and species diversity by season over four years on the study area, Hernando County, Florida, February 1976 to June 1979.

	Season			
	Winter	Spring	Summer	Fall
Mean density (birds/km²)	246	424	570	417
Standard deviation	(303)	(456)	(468)	(557)
Percent permanent residents	78	71	84	88
Species on quadrats ($\bar{x}$)	14.0	18.5	19.5	8.0
Diversity (H′)*	2.19	2.61	2.64	2.37
Equitability (J′)**	0.83	0.89	0.89	0.82
Total species on study area ($\bar{x}$)	33.0	36.0	29.5	35.0
Diversity (H′)*	2.81	3.00	2.86	2.85
Equitability (J′)**	0.80	0.84	0.85	0.80

*$H' = -\Sigma\, p_i \log_e p_i$
**$J' = H'/\log_e S$

dominant in the avian community, but they still represented 83% of the total biomass in both summer and winter.

"Quadrat-only" diversity, the more conservative and restrictive diversity measure, showed greater seasonal changes than "total-count" diversity, being lowest in winter and highest in summer (Table 3). Total-count diversity was higher than quadrat-only diversity at all seasons, largely because it was based on more species, but it showed little seasonal fluctuation, except for a peak in spring.

The bird community was dominated by insectivores at all seasons except fall when omnivores, such as Red-winged Blackbirds, Tufted Titmice, Red-bellied Woodpeckers, Blue Jays, and Carolina Chickadees predominated (Fig. 2). Insectivore populations were highest in spring and summer when insect abundance was presumed to be highest. The granivore group was dominated by Northern Bobwhites, and during summer when they were most abundant, the combination of their high numbers and large size amplified their biomass density (Fig. 2).

Since all summer-only and winter-only residents except the Ruby-throated Hummingbird were carnivores (includes raptors, insectivores, and American Woodcock), the greatest seasonal dynamics occurred within the carnivore guild. During summer, 35% of the insectivore population consisted of summer-only residents; during winter, 42% were winter-only residents. Thus, eight winter-only, insectivorous migrants from the north (plus the American Woodcock) replaced six summer-only, insectivorous species that migrated farther south (plus the Ruby-throated Hummingbird). In some cases, winter-only immigrants served as ecological equivalents to summer-only emigrants. For instance, Whip-poor-will replaced Chuck-will's-widow, and Red-eyed Vireo and Yellow-throated Vireo, both midstory gleaners, left in late summer and were

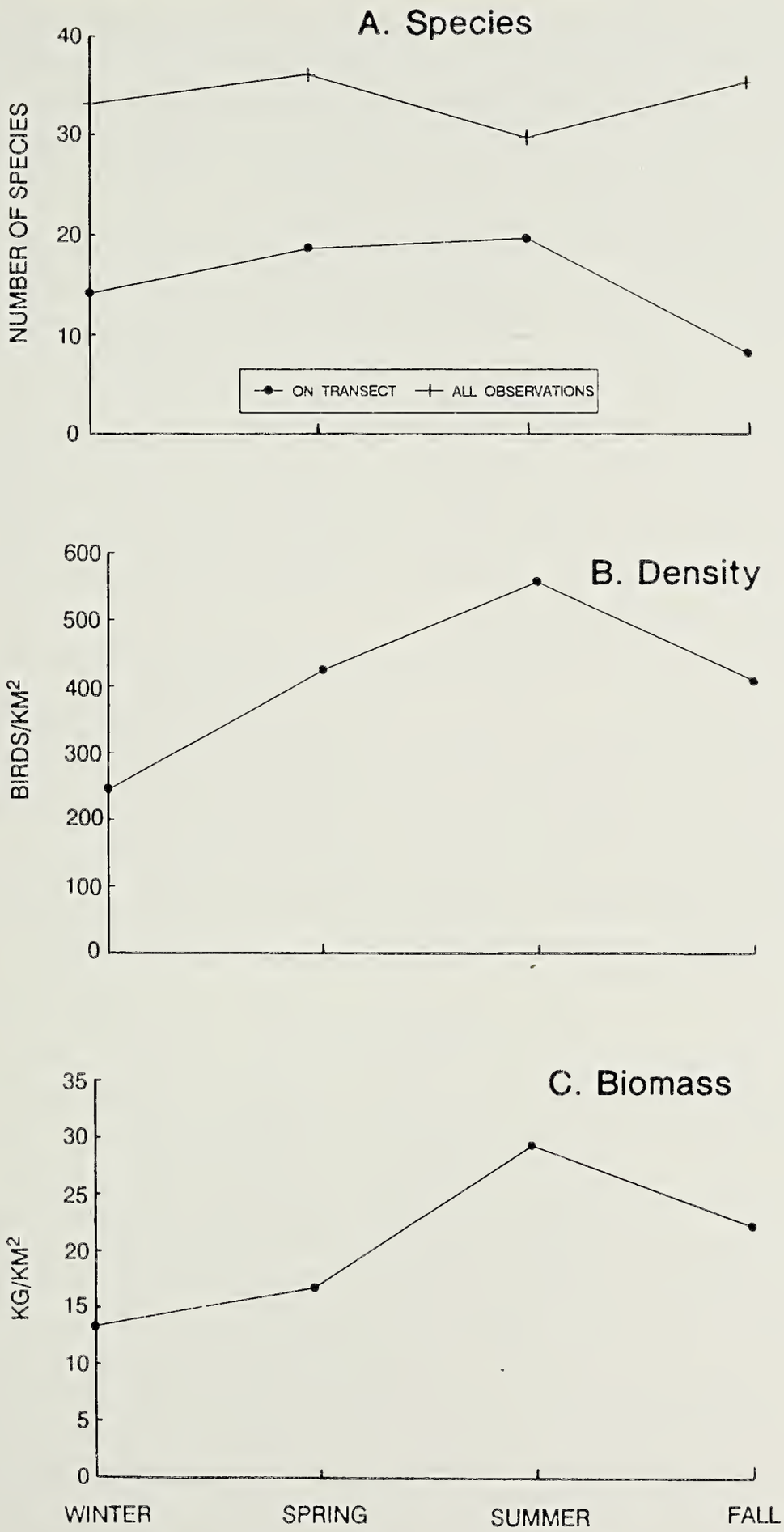

Figure 2. Seasonal changes in numbers of species (A), density (B), and biomass (C) of a longleaf pine bird community in peninsular Florida.

replaced by the Ruby-crowned Kinglet in winter. In other cases there was no apparent correspondence between species leaving and those arriving. For example, the ground foraging Ovenbird and Hermit Thrush occurred during winter when food resources might be more abundant near the ground, but there were no apparent ecological counterparts on the area during summer.

In addition, to the species replacement described above, considerable seasonal turnover occurred within species that were classified as permanent residents. The most dramatic case of this seasonal dynamic occurred within the omnivore trophic group. Red-winged Blackbirds increased from very low numbers during summer to the second most abundant species during fall and declined to modest densities during winter (Table 2). Red-bellied Woodpeckers increased from 5/km^2 during winter to 24/km^2 during spring, then declined to 14/km^2 during summer. Blue Jay numbers followed a similar pattern. Thus, seasonal shifts within these "permanent-resident" species also constituted an important aspect of overall community dynamics.

Thirteen cavity-nesting species were present on the study area as either permanent or summer residents. Tufted Titmice and Great-crested Flycatchers were the most common cavity nesters during summer. Summer densities of primary and secondary cavity nesters were almost the same (100.6/km^2 and 92.9/km^2, respectively) if numbers of chickadees and titmice were divided equally between the two categories. It should be kept in mind, however, that these data (Table 2) were collected in summer after at least first broods had fledged and that these densities can not be translated to numbers of breeding pairs.

Discussion

Longleaf pine communities formerly dominated the lower coastal plain but have now been reduced to a trivial amount in states such as Florida. The overall decline of longleaf pine communities may be over 98%, and the remaining stands are mostly of poor quality (Noss 1988, Ware et al. in press). This leaves us in the unenviable position of attempting to manage second growth stands for biotic diversity without a reference point. This and a study by Repenning and Labisky (1985) help to establish that reference point. In addition, this site is at 28° N, just north of the "tropical threshold" described by Rabenold (1979) and sufficiently far down the Florida peninsula to manifest the "peninsula effect."

Our density estimate of 570 birds/km^2 during summer fell within the range of reported values (Short 1979, Engstrom 1981, Repenning and Labisky 1985) and thus neither supports nor detracts from the notion that old-growth longleaf pine supports notably high densities of birds. The winter density of 246 birds/km^2 was lower than we had anticipated

and deserves further verification. The fact that our winter density was significantly ($P < 0.05$) less than the density during other seasons shows that not all southeastern coastal plain community types support higher bird densities during the winter. We believe this is because longleaf pine characteristically occurs on drier sites than other common pine species (excluding *P. clausa*). Although all southeastern "piney woods" are fire-maintained communities, longleaf is best adapted to frequent fire (Stoddard 1962). In combination, the drier sites and more frequent fire generally result in a less shrubby understory than occurs in slash pine (*P. elliottii*) or loblolly pine (*P. taeda*) stands. It is the broad-leaved evergreen shrubs and vines (e.g., *Ilex* spp., *Lyonia* spp., *Smilax* spp.) that produce large quantities of fruit and support arthropod populations during late fall and winter (Harris et al. 1974, Rowse 1980). Thus, without an abundance of these plant species in the understory (Table 1), and without abundant seeds and arthropods provided by a dense forb layer, there is little food available during winter. This contrasts distinctly with other southeastern community types, such as bottomland hardwoods, where winter bird densities far exceed breeding bird densities (Dickson 1978, Harris and Vickers 1984).

Unlike the bird communities of temperate North America where winter species represent a small subset of the breeding bird community, the long-leaf pine bird community is seasonally more balanced. On our study area, 23 winter-only species joined 38 permanent-resident species, while 11 summer-only species migrated to Central and South America. As noted above, a number of obvious cognate pairs exists (Tree Swallow/Purple Martin, Whip-poor-will/Chuck-will's-widow, Ruby-crowned Kinglet/Red-eyed Vireo and/or Yellow-throated Vireo, and maybe others), which fill apparently similar foraging guilds in the community. Other species including the Ovenbird, American Woodcock, Hermit Thrush, and American Robin forage on or near the ground at a time when deciduous trees such as turkey oaks have lost their foliage, and food resources occur closer to the ground.

These results are somewhat different, though not unexpected from the pattern reported for a mature longleaf pine forest in southwest Georgia (Engstrom 1981). Being nearly 250 km farther north, that area supported fewer (8 vs. 14) winter-only species and slightly more (10 vs. 7) summer-only species than our plots.

Species richness and diversity calculated from our data were slightly higher than generalizations published elsewhere (Tramer 1974, Bock and Lepthien 1975, Peterson 1975, Short 1979). We recorded more breeding species (23 vs. 20) and fewer wintering species (27 vs. 32) than Tramer (1974) predicted, but we presume these discrepancies to be non-significant. Rabenold (1979) also has examined patterns of alpha diversity with respect to latitude, although he considered only deciduous forests. Our

longleaf pine community had more breeding passerine species (16) than Rabenold (1979) predicted (< 11), and higher H′ (2.48) than he predicted (< 2.2) considering only passerines. The greater species diversity of our study area was perhaps surprising in light of the prevailing view that southeastern pine forests have little habitat diversity compared to deciduous forests. Engstrom et al. (1984), however, found higher breeding bird species richness in a structurally simple longleaf pine forest in the Florida Panhandle than in a more complex beech-magnolia forest. They explained this by noting that longleaf pine, until recently, was the dominant vegetation of this region; more birds could have adapted to this habitat due to its extensive area. The apparent increased diversity on our study area compared with other pine forests is perhaps explained by our having worked in a natural old-growth stand rather than in planted or second-growth stands.

Permanent residents dominated the avian community on our study area summer and winter. It appears, therefore, that the avian community of the longleaf pine ecosystem is far more self-contained than those of other southeastern forest types. Possibly the food resources in the longleaf pine forest do not fluctuate as much seasonally as those in other southeastern forest types, and the permanent resident bird population is better able to track the available food supply than birds of slash and loblolly pine and hardwood forest communities, leaving less resource space for winter residents.

Our study helps to establish the nature of the avifauna characteristic of old-growth longleaf pine for future reference. However, the fact that three of four species, Red-cockaded Woodpecker (*Picoides borealis*), Brown-headed Nuthatch (*Sitta pusilla*), Bachman's Sparrow (*Aimophila aestivalis*) and Pine Warbler, characteristic of mature, open pinelands were not observed on our study area deserves comment. Red-cockaded Woodpeckers would normally be expected to occur in a 160 ha tract of old-growth longleaf pine, were it surrounded by adequate foraging area and other colony sites. However, this tract was isolated and vast distances separated it from the nearest known clan. Fire suppression and the resulting increase in understory vegetation are probably responsible for the absence of Bachman's Sparrow, a ground-nesting species, and may have contributed also to the absence of the Brown-headed Nuthatch and Red-cockaded Woodpecker.

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NOTES

Fla. Field Nat. 19(2): 49-51, 1991.

PIROPLASMS OF WHITE-TAILED DEER (*ODOCOILEUS VIRGINIANUS*) IN FLORIDA

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The white-tailed deer (*Odocoileus virginianus*) is host to two species of piroplasms (Apicomplexa: Piroplasmorida) in various portions of its range: *Babesia odocoilei* Emerson and Wright 1970 (Babesiidae), and *Theileria cervi* Bettencourt, Franca and Borges 1907 (Theileriidae) (Kingston 1981). *Babesia odocoilei* is apparently uncommon, for it has been reported in white-tailed deer only in Texas (Emerson 1969; Emerson and Wright 1968; Waldrup et al. 1989a, b), Oklahoma (Waldrup et al. 1989a), and Virginia (Perry et al. 1985). Spindler et al. (1958) found a *Babesia* species in white-tailed deer in New Mexico, but did not provide a species designation. Although hemolytic disease has been documented in immunocompromised deer (Emerson and Wright 1968, Perry et al. 1985), the effects on wild populations have not been determined (Waldrup et al. 1989a). *Theileria cervi*, on the other hand, is more common and is known in white-tailed deer from Missouri, Oklahoma, Texas, Arkansas, Virginia, and Alabama (Kingston 1981), as well as from Florida, Georgia, South Carolina, and Maryland (Davidson et al. 1983). Marburger et al. (1965) suggested that *T. cervi* had been responsible for the massive die-off of white-tailed deer (some 30,000) in the Central Mineral Region of Texas within a two-week period in late summer, 1962. Experimental studies on the pathogenicity of *T. cervi* by Robinson et al. (1967) did not provide conclusive evidence that this piroplasm is pathogenic to deer under normal conditions, but the authors suggested that this parasite represents a potential threat when high deer density and poor nutrition coincide with the presence of other diseases and parasites.

Blood samples of 21 white-tailed deer were available from Duval, Alachua, Levy, and Citrus counties in northern Florida. Thin blood films were prepared, fixed in absolute methanol and stained by standard Giemsa technique. One deer, a 7-8 month old male collected in December 1989 in Citrus County, showed a moderate erythrocytic infection of a *Babesia* that did not differ in appearance from *B. odocoilei* (Fig. 1, Nos. 1-5). This is the first report of a *Babesia* infection in white-tailed deer from Florida, and apparently is only the second report from the southeastern United States. Perry et al. (1985) examined six white-tailed deer from the Great Dismal Swamp of southeastern Virginia, and found *B. odocoilei* infections in two yearlings. *Theileria cervi* (Fig. 1, Nos. 6-8) was found in all 16 white-tailed deer from Duval County (aged 6 months to 8 years, eight males and eight females, collected December 1978 to January 1979), and in two of two from Alachua County (a yearling male in December 1977, and another male, 3-5 years old, in October 1982). Two deer collected in Levy County were negative (a female, 6 months old, in December 1982; and a male >1 month of age, in May 1974). *Babesia* and *Theileria* were readily distinguished by size, shape, and the relative quantity of cytoplasm in the infections reported here. In the *Babesia* infection, the nuclei were 1.5 to 3 times the size of the *Theileria* nuclei, with proportionately greater amounts of cytoplasm (Fig. 1, Nos. 1-5), and the comma-shape characteristic of the genus was commonly seen (Fig. 1, No. 4). *Theileria* were elongate (Fig. 1, No. 6) or round (Fig. 1, Nos. 6-8). Even the largest rounded forms (Fig. 1, No. 8) showed a cytoplasm quantity less than half that of the nucleus. In cooperation with the Florida Game and Fresh Water Fish Commission and the U. S. National Park Service, our laboratory has examined white-tailed deer from Collier, Monroe, and Dade counties in

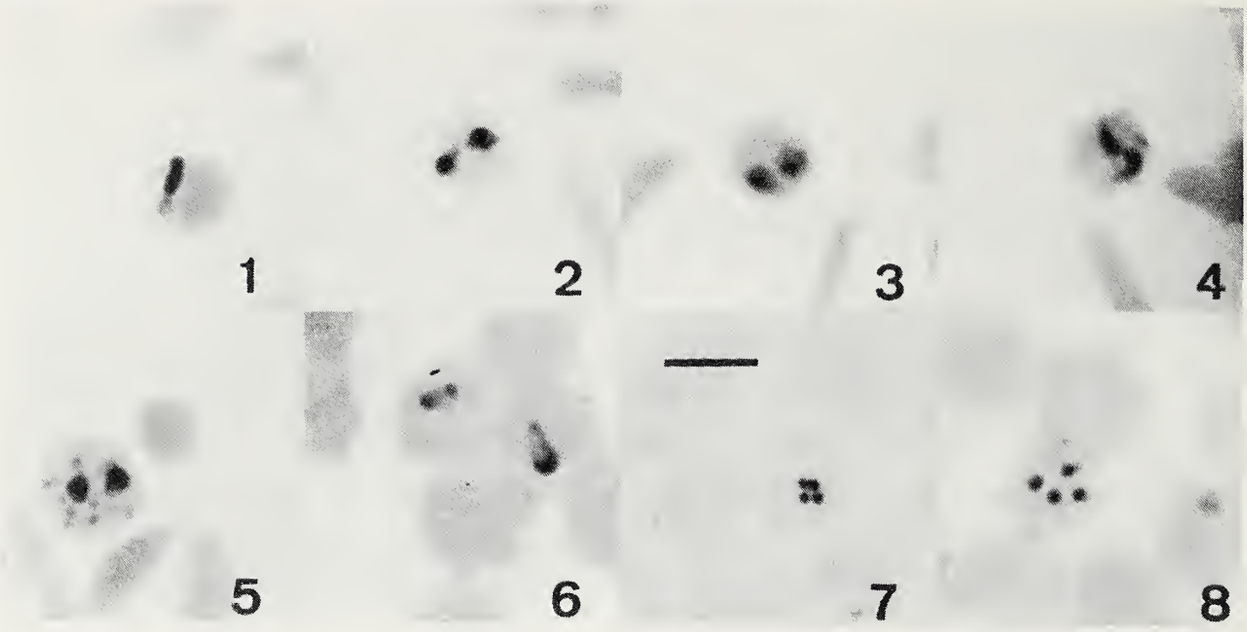

Figure 1. Piroplasms found in white-tailed deer. Nos. 1-5 show *Babesia odocoilei* in erythrocytes of *Odocoileus virginianus*, Citrus County, Florida. Nos. 6-8 show *Theileria cervi* in erythrocytes of *Odocoileus virginianus*, Duval County, Florida. Horizontal bar = 4 μm; slides stained by standard Giemsa technique.

southern Florida between 1984 and 1990. Blood samples from 278 of these were examined for haemoparasites, and only *Trypanosoma cervi* was found (Telford et al. 1991; Telford and Forrester, unpublished data). It was detected by blood culture specific for trypanosomes and examination of standard thick and thin blood films. The use of blood films to diagnose piroplasm infections only provides evidence that the parasites are present in the community; negative results do not necessarily indicate that they are absent. Because deer chronically infected with piroplasms may not show patent infections (Kingston 1981), prevalence can only be established by serological, subinoculation, or specialized culture techniques.

The natural vectors of *T. cervi* and *B. odocoilei* in Flordia have not been determined, but evidence suggests that the ticks *Amblyomma americanum* and *Ixodes scapularis* might be involved (Kingston 1981, Davidson et al. 1983, Waldrup et al. 1990). Both ticks have been found on white-tailed deer in Florida (Forrester in press).

Representative blood films have been deposited in the U. S. National Parasite Collection, Beltsville, Maryland (Accession Nos. 81275-81276). We wish to thank W. O. Sermons and J. W. McCown of the Florida Game and Fresh Water Fish Commission for their help in obtaining the white-tailed deer. M. D. Young, E. C. Greiner, C. H. Courtney, and M. G. Spalding reviewed the manuscript, and we thank them. This research was supported by contracts from the U. S. National Park Service and the Florida Game and Fresh Water Fish Commission, and is a contribution of Federal Aid to Wildlife Restoration, Florida Pittman-Robertson Project W-41. Florida Agricultural Experiment Stations Journal Series No. R-00928.

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Fla. Field Nat. 19(2): 51-53, 1991.

SUCCESSFUL NESTING BY REDDISH EGRETS AT OSLO ISLAND, INDIAN RIVER COUNTY, FLORIDA

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The Florida population of the Reddish Egret (*Egretta rufescens*) has been slow to recover from the impact of plume-hunting, which caused the near extirpation of the species by 1890 (Robertson 1978). Still a rather rare species throughout its range (Robertson 1978, Hancock and Kushlan 1984), the Reddish Egret has only recently begun to expand its Florida nesting range from Everglades National Park and the Lower Florida Keys west to Marco Island and north to Tampa Bay (Bancroft 1971, Paul et al. 1975, Paul et al. 1979, Paul 1982, Hancock and Kushlan 1984). The gradual recolonization of its former breeding

range along Florida's southwest Gulf coast during the past 20 years (Paul et al. 1975, Robertson 1978) has not been documented along the Atlantic coast (Paul et al. 1979), except in the Haulover Island heronry where Paul (1986) reported a substantial increase of Reddish Egret numbers with counts of as many as 41 fledglings.

Only three confirmed Reddish Egret nest sites have been reported for Florida's east coast north of Arsenicker Keys in Biscayne Bay (Kale 1976). Reddish Egret nests have occurred rather regularly on Haulover Island in Merritt Island National Wildlife Refuge, Brevard County (Paul et al. 1979, Paul 1982); Pelican Island in Pelican Island National Wildlife Refuge, Indian River County (Paul 1982, Rodgers and Schwikert 1986); and Riomar Island, Indian River County (Maxwell and Kale 1974, Paul 1982, pers. observ.).

This note reports successful nesting by Reddish Egrets at Oslo Island (designated as "IR 38" in the Fla. Dept. of Nat. Res. Spoil Island Mgmt. Plan) in Indian River County. Oslo Island is a 1.54 ha Indian River Lagoon spoil island located about 6.0 km south of Riomar Island in Vero Beach.

During the spring and summer of 1990, I monitored nesting colonial waterbirds on Oslo Island (Table 1). Nest counts were accomplished by (1) using a boat to drift along the island's perimeter about 20 m from the mangrove fringe, and (2) slowly entering the interior

Table 1. Population estimate of breeding pairs of colonial waterbirds on Oslo Island, Indian River County, Florida in 1990.

Species	No. pairs	Relative abundance (%)
Brown Pelican *Pelecanus occidentalis*	180	21.0
Double-crested Cormorant *Phalacrocorax auritus*	50	5.8
Anhinga *Anhinga anhinga*	5	0.6
Great Blue Heron *Ardea herodias*	14	1.6
Great Egret *Casmerodius albus*	100	11.6
Reddish Egret *Egretta rufescens*	1	0.1
Snowy Egret *Egretta thula*	100	11.6
Little Blue Heron *Egretta caerulea*	50	5.8
Tricolored Heron *Egretta tricolor*	125	14.5
Cattle Egret *Bubulcus ibis*	150	17.4
Black-crowned Night-Heron *Nycticorax nycticorax*	65	7.5
Yellow-crowned Night-Heron *Nycticorax violaceus*	1	0.1
White Ibis *Eudocimus albus*	20	2.3
Total	861	99.9

of the colony by foot. Entry was from the unoccupied section of the island during late incubation and early nestling stages so as to minimize disturbance-related nesting failures (Frederick and Collopy 1989). Approximately 60% of the island's area was used by the 861 pairs of 13 species comprising the nesting colony (density = 936 pairs/ha).

In mid-April, I discovered a pair of adult Reddish Egrets in brilliant breeding plumage (Meyerriecks 1960). On 2 May 1990, I located the nest about 3 m high in a white mangrove (*Laguncularia racemosa*). One adult was on the nest exhibiting incubation posture, while its mate perched nearby. The nest contained three nestlings about two weeks of age on 3 June. On 16 June the three nestlings were perching on the edge of the nest and supporting branches. I found the three young Reddish Egrets perched together in the mangroves approximately 20 m from the nest on 24 June. Both adults and the three juvenile Reddish Egrets remained together in the colony through the end of June.

During July 1990, I surveyed the islands from Riomar (IR 33) to Oslo (IR 38) and located Reddish Egrets on all seven islands, including five adults, two yearlings, and eight juveniles. The juveniles were distributed in three cohesive groups of three, three, and two; each group was accompanied by a single adult. The associations of adults and apparent juvenile brood mates are indicative of additional Reddish Egret nests in the near vicinity (R. Paul, pers. comm.). These observations suggest that Reddish Egrets may now be reoccupying more of their former Atlantic coast breeding range.

This paper benefited from the comments provided by R. Paul and J. Rodgers.

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Fla. Field Nat. 19(2): 54, 1991.

UNUSUAL CAUSE OF MORTALITY FOR A NORTH FLORIDA COYOTE (*CANIS LATRANS*)

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The expansion of coyotes (*Canis latrans*) into the southeastern United States has been well documented (Paradiso 1966, Cunningham and Dunford 1970, Hill et al. 1987), and the role of humans has been described as a factor in this expansion (Wooding and Hardisky 1990). The distribution of coyotes in Florida was recently surveyed by Wooding and Hardisky (1990). They concluded coyotes are well established across the panhandle and into north-central Florida. Open habitats, such as highway right-of-ways and airports, are likely used for foraging (Wooding, pers. comm.). Automobiles are recognized as a source of mortality for this species (Case 1978); however, this is the first reported case of aircraft as a source of mortality.

On 6 June 1990 a juvenile male coyote was struck by a commercial jet landing at the Tallahassee Regional Airport. The incident occurred at about 2200 hrs and was reported by the pilot. Mr. William Fox of the general aviation ground crew went on to the runway to retrieve the animal. Mr. Fox found the coyote pup was still alive but unable to walk after the accident and contacted a local volunteer wildlife rescue and rehabilitation group. A veterinarian's examination revealed the coyote suffered from multiple fractures, including the pelvis. The coyote was euthanized due to these extensive orthopedic injuries. The specimen (UF24833) was deposited at the Florida Museum of Natural History in Gainesville and is the first specimen from Leon County in that collection.

The Tallahassee Regional Airport is bordered by a swampy chain of lakes complex to the north and east. Apalachicola National Forest abuts the south and west boundaries of the airport. Mr. Fox reported that a family group of coyotes were observed on the airport grounds in the spring of 1990. Coyotes were seen within the perimeter fence of the airport before, but this is the first year a family group was observed.

We thank M. Blackburn, W. Fox, and T. Mountain for sharing information on the fate of this coyote. J. Wooding and D. Hirth provided additional information on coyote ecology. J. Rodgers and an anonymous reviewer provided comments which improved the manuscript.

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Fla. Field Nat. 19(2): 55, 1991.

BLUE JAY IMITATES HAWK FOR KLEPTOPARASITISM

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Jack P. Hailman's (1990, Fla. Field Nat. 18: 81-82) discussion of why Blue Jays (*Cyanocitta cristata*) imitate raptors prompts me to put the following observation on record. On 8 February 1975, S. L. Sutton reported to me that he had observed a Blue Jay using raptor calls to obtain food by frightening Boat-tailed Grackles (*Quiscalus major*).

The incident observed by Sutton took place at the picnic area near Picnic Pond at St. Mark's National Wildlife Refuge, Waukulla County, Florida. This picnic area is frequented by Boat-tailed Grackles, which are fed by humans and feed on crumbs left by picnickers. On this occasion, a grackle was feeding on a large piece of bread on the ground in the open when a jay flew into the oak tree overhead and gave a vocal imitation of a Red-shouldered Hawk (*Buteo lineatus*). On hearing this predator call directly overhead, the grackle dropped the food and took cover, whereupon the jay swooped down and ate the food.

This particular behavior is apparently not widespread among Blue Jays, but Sutton was convinced that this jay had learned to use predator calls to scare other birds away from food. Hailman proposed four hypotheses to explain raptor imitations by Blue Jays: (1) to signal that a raptor of this species is in the vicinity, (2) to indicate to companions where a raptor has been in the past, (3) to deceive some third species into believing a raptor is present, and (4) jays simply incorporate environmental sounds into their repertoires. He favored the second hypothesis, but this observation supports the third. Hailman noted that "the possible benefit to the jay from such deception is unclear." This observation, however, suggests one way a jay might profit from this mimicry.

It is possible that this was an isolated incident, perhaps even unique to this individual jay. Other observers should be alert to examples of this behavior to further examine the hypothesis that jays mimic raptors as an aid to kleptoparasitism.

Fla. Field Nat. 19(2): 55-56, 1991.

BANDED BROWN PELICANS IN SOUTHEASTERN FLORIDA

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Two banded Brown Pelicans (*Pelecanus occidentalis*) were observed as they perched on the railing of the fishing pier at Lake Worth, Palm Beach County, Florida (Lat. 26°37′N, Long. 80°2′W), during the autumn of 1990. The birds permitted close approach and we were able to read the band numbers using 10x binoculars. The band numbers were triple checked for accuracy. Both birds appeared to be healthy judging from plumage conditions, soft parts, and flying abilities.

The first pelican was observed on 22 October, was seen again on 14 November, and had band No. 599-36163. The bird hatched in captivity at the Suncoast Seabird Sanctuary,

Indian Shores, Pinellas County, Florida. It was banded and released on 27 May 1984 as a hatching year bird at Tarpon Key, Pinellas County, Florida (Lat. 27°40′N, Long. 82°42′W). This pelican was banded by staff of the Suncoast Seabird Sanctuary as cooperators/subpermittees of the Florida Game and Fresh Water Fish Commission (USFWS Bird Banding Laboratory, Stephen A. Nesbitt, pers. comm.). The bird was one of several hatching in 1984 at the sanctuary (see Nesbitt et al. 1980, Wildl. Soc. Bull. 8: 259-262).

The second pelican was seen on 30 October and again on 4 November; its band number was 559-55989. This bird was banded on 22 July 1987 as a nestling at a spoil island at Oregon Inlet, Dare County, North Carolina (Lat. 35°46′N, Long. 75°35′W), by John H. Buckalew (USFWS Bird Banding Laboratory, John H. Buckalew, pers. comm.).

These records indicate a tendency of some individuals within the North Atlantic population of Brown Pelicans to disperse widely, and demonstrate movement of birds between the Gulf and Atlantic coasts of Florida. For a complete analysis of movements and band recoveries of Brown Pelicans in eastern North America, refer to Schreiber and Mock (1988, J. Field Ornithol. 59: 171-182).

REPORT

Fla. Field Nat. 19(2): 56-57, 1991.

FOS Records Committee Report.—This is the sixth report of the Florida Ornithological Society Records Committee, covering 1988. Table 1 contains 30 records of which 21 were accepted and 9 were not accepted. One record (88-136) was withdrawn. Committee members are Jocelyn Lee Baker (secretary), Wally George, Larry Hopkins, William Robertson, and Henry Stevenson.

Sightings of rare birds in Florida should be submitted to the secretary of the Records Committee. All records published thus far have been placed in a permanent file in the FOS Archives at the Florida Museum of Natural History in Gainesville where they are available for research. Documentation for accepted birds listed in this report was submitted by: Lyn S. Atherton, William Boyle, James Cavanagh, William E. Dowling, Margery M. Eaton, Gene Fleming, Wally George, Gloria Hunter, Dean K. Jue, Cecil M. Kilmer, Howard P. Langridge, Greg W. Lasky, Peg Lindauer, Mitchell Lysinger, Bruce D. Neville, John Ogden, Helen Parker, Max Parker, P. William Smith, Allan Strong, and Paul W. Sykes.—**Jocelyn Lee Baker**, Secretary, 851 North Surf Road, Apartment #302, Hollywood, Florida 33019.

Table 1. FOS Records Committee Report—1988.

Number	Date received	Species	Date observed	Location (County)	Decision
88-160	21 December 88	Arctic/Pacific Loon	18 June 88	(Escambia)	Accepted
88-133	9 February 88	Ross' Goose*	22 December 87	Tallahassee (Leon)	Accepted
88-135	14 February 88	Ferruginous Hawk*	10 December 87	St. Marks NWR (Wakulla)	Not accepted
88-150	15 June 88	Ferruginous Hawk	11 June 88	W. Palm Beach (Palm Beach)	Not accepted
88-139	22 March 88	Rough-legged Hawk	16 January 88	Bradenton (Manatee)	Not accepted
88-159	4 December 88	Golden Eagle	27 September 88	SW 200th St. (Dade)	Not accepted
88-130	26 January 88	California Gull	13 March 83	Univ. Causeway (Santa Rosa)	Not accepted
88-141	30 April 88	Zenaida Dove	8-9 April 88	(Sarasota)	Not accepted
88-146	10 June 88	Lesser Nighthawk	2-6 May 88	Dry Tortugas (Monroe)	Accepted
88-131	27 January 88	Buff-bellied Hummingbird*	6 December 87	(Walton)	Accepted
88-154	22 July 88	Anna's Hummingbird*	17 January 88	Tallahassee (Leon)	Accepted
88-138	9 March 88	Allen's Hummingbird	27 December 88	Cedar Key (Levy)	Not Accepted
88-158	22 October 88	Say's Phoebe	10 October 88	St. George Island (Franklin)	Accepted
88-134	9 February 88	LaSagra's Flycatcher	15 January 88	Key Largo (Monroe)	Accepted
88-157	7 October 88	LaSagra's Flycatcher**	14 May 88	Birch SP (Broward)	Accepted
88-144	26 May 88	Bahama Swallow	18 May 88	Homestead (Dade)	Accepted
88-152	14 July 88	Bahama Swallow	21-22 June 88	Everglades NP (Monroe)	Accepted
88-132	7 February 88	Varied Thrush	9-11 January 88	Panama City (Bay)	Accepted
88-148	14 June 88	Bahama Mockingbird	9 March 88	Everglades NP (Monroe)	Accepted
88-142	3 May 88	Bahama Mockingbird	21 April 88	Hypoluxo Island (Palm Beach)	Accepted
88-151	15 June 88	Thick-billed Vireo	6 May 88	Hypoluxo Island (Palm Beach)	Not accepted
88-156	4 August 88	Warbling Vireo	2 May 88	Ft. DeSoto Park (Pinellas)	Accepted
88-143	25 May 88	Yellow-rumped (Audubon's) Warbler	30 April 88	Dry Tortugas (Monroe)	Accepted
88-153	21 July 88	Bananaquit	10 April 88	Card Sound (Monroe)	Accepted
88-149	15 June 88	Stripe-headed Tanager	28 April 88	Bill Baggs SP (Dade)	Accepted
88-145	2 June 88	Black-faced Grassquit	17 April 88	John Lloyd SP (Broward)	Not accepted
88-147	10 June 88	Shiny Cowbird	25-27 May 88	Ft. DeSoto Park (Pinellas)	Accepted
88-155	3 August 88	Northern Oriole	9 July 88	St. Marks NWR (Wakulla)	Accepted
88-140	5 April 88	Northern (Bullock's) Oriole	2 April 88	Everglades NP (Monroe)	Accepted
88-137	20 February 88	Pine Siskin*	19 July 87	Nokomis (Sarasota)	Accepted

*Documentation includes photograph(s).
**Documentation includes sonogram.

FIELD OBSERVATIONS

Fla. Field Nat. 19(2): 58-64, 1991.

FALL REPORT: SEPTEMBER-NOVEMBER 1990

FOS Field Observation Committee

Compiler: *Jim Cox, Florida Game and Fresh Water Fish Commission*
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The observations listed here are based on reports submitted to the FOS Field Observation Committee (Linda Cooper, Jim Cox, Peggy Powel, Bill Pranty, and Wayne Hoffman). These sightings are not subjected to a formal peer review and must be considered tentative pending further review. We encourage observers to report their sightings to the FOS Records Committee (c/o Jocie Baker, Secretary, 851 N. Surf Rd., #302, Hollywood, FL 33019) for formal review. We also encourage observers to prepare notes and articles to document extremely rare and unusual sightings.

Several conventions have been adopted to save space. A 3-character set of alphanumeric initials is used to identify contributors within the accounts of individual species. A complete list of observers and corresponding initials is provided at the end of the report. The list of observers is organized alpha-numerically using the 3-character initials. Names of observers for this report are drawn from a master list containing names of > 150 observers, and this procedure may result in occasional gaps in the alpha-numeric sequence (e.g., the listing of BB2 without a previous BB1). Another convention adopted is the use of common names exclusively. Persons interested in scientific names should consult AOU (1983. Check-list of the North American Birds. 6th ed. Washington, D.C., Am. Ornithol. Union) and revisions as published in The Auk. Other abbreviations used occasionally are: imm., immature; m. obs., many observers; NF, national forest; NP, national park; NWR, national wildlife refuge; SP, state park; SRA, state recreation area; WMA, wildlife management area; and S, W, N, E, etc. for compass headings. Unless necessary to clarify location, the counties of named locations are omitted.

Summary of the Fall Season

The fall season will probbaly rank as one of the more unusual seasons of 1990. Though no great concentrations of migrants were reported, and more observers reported low numbers of common migrants, high counts of several uncommon/accidental species were reported from around the state. One of the more unsual observations in this category was 10 Wilson's Warblers in Gulf County in mid-September, and many sightings of Yellow-headed Blackbirds and Canada Warblers. There were also several "early" observations of wintering species in several areas, particularly along the central Gulf coast, which were in some cases south of normal winter ranges. Included in this category are southerly/early records for Winter Wrens, Golden-Crowned Kinglets, Yellow-rumped Warblers, and others.

Raptor migration in the Keys was spectacular. Falcon migration began in earnest around 30 September and was heavy at least through 25 October. Broad-winged Hawk migration began about 27 September, paused for unfavorable weather (tropical storms) from 3 to 12 October, and resumed on 13 October. In November, most Broad-winged Hawk movement was north through the Keys, presumably by birds that decided against crossing to Cuba. Sharp-shinned Hawks began to move through beginning about 1 October, and movement was heavy throughout the month.

Drought conditions continued to produce low counts of wading birds and ducks, particularly in southern and central Florida. However, reports of high numbers of ducks and

certain wading birds in rice fields of western Palm Beach County deserve mention. Agricultural fields in this area are dominated by sugar cane, which has limited value to birds and wildlife. A conversion of some areas to rice production offers a potentially beneficial change for many species. Areas converted to rice production had some interesting occurrences of important species such as Glossy Ibis, Fulvous Whistling-Duck, and Blue-Winged Teal.

The FOS Field Observation Committee thanks all who contributed to this column. Please write to Jim Cox, compiler, concerning any unusual sightings that were not reported here.

Species Accounts

Pacific Loon: 2 at Santa Rosa Island (Escambia Co.) on 21 and 27 Nov (RD1), 5th area record.

Eared Grebe: 8 at phosphate mines (Polk Co.) on 11 Nov (PF1, CG1, PT2), rare but regular for several years.

Sooty Shearwater: 1 at Alligator Point (Franklin Co.) on 24 Nov (LA1, BA1, LH1); the bird was observed from land as it fed offshore behind a shrimp boat; very rare in Gulf.

American White Pelican: many reports from around the state, including several inland reports; 34 S of Wewahitchka (Gulf Co.) on 14 Nov (SA1); high count of 8000 at phosphate mines (Polk Co.) on 25 Nov (PF1).

Magnificent Frigatebird: 1 at Cinco Bayou (Ft. Walton Co.) on 4 Oct (BR1); 1 at Gulf Breeze (Ft. Walton Co.) on 4 Nov (SD2).

Great Blue Heron, white morph: 1 at Archbold Biological Station (Highlands Co.) on 17 Sep (JL1); second record for station.

Reddish Egret: continues to show up in strong numbers in N Florida; 1 imm. at St. Marks NWR 15 Aug - 14 Oct (DS1); 1 imm. at Cedar Key (Levy Co.) on 10 Sep (DH2); 2 at Ward's Bank (Duval Co.) on 18 Oct (LB1); 4 imm. at Santa Rosa Island on 12 Nov (RD1, JP1), largest count for this area.

Glossy Ibis: 1200 in rice fields (Palm Beach Co.) on 2 Sep (PS1); 1 in Key West on 23 Sep (JO1), rare in Keys.

Roseate Spoonbill: 1 at St. Marks NWR on 1 Sep (RW2); 1 at Marquesas Keys on 13 Sep (TW1); unusual locations.

Fulvous Whistling-Duck: 800 in rice fields (Palm Beach Co.) on 2 Sep (PS1), high count.

Black-bellied Whistling-Duck: 1 in rice fields (Palm Beach Co.) on 2 Sep (PS1); new locality.

Greater White-fronted Goose: 4 at St. Marks NWR on 11 (DS1) and 13 Nov (DM2); 7 S of Wewahitchka (Gulf Co.) from 14 to 18 Nov (SA1, BN2); 3 at Ft. Walton Beach sewage treatment plant from 9 Nov (RD1) to 5 Dec (DW1, CW1).

Snow Goose: many reports from around the state; 50 + S of Wewahitchka (Gulf Co.) from 14 to 18 Nov (SA1, BN2) was a high count; 1 white morph imm. at Cudjoe Key on 20 Nov (MB2) was unusual.

Blue-winged Teal: 1500 in rice fields (Palm Beach Co.) on 2 Sep (PS1), high count.

American Wigeon: high count of 450 at phosphate mines (Polk Co.) on 11 Nov (PF1).

Greater Scaup: a flock of ca. 500 off St. Marks NWR on 25 Nov (BP1).

Black Scoter: 13 at Ft. Pickens SP (Escambia Co.) on 10 Nov (RD 1).

White-winged Scoter: 5 at Ft. Pickens SP (Escambia Co.) on 10 Nov (JP1); rare in area.

Red-breasted Merganser: unusual inland record at phosphate mines (Polk Co.) on 12 Nov (DF1, BK1, MK1).

Turkey Vulture: albino along Route 60 (Polk Co) on 16 Oct (HA1).

BLACK-SHOULDERED KITE: as many as 14 in a small area of the east Everglades from Oct to Nov (m. obs.); few other aggregation areas known.

SNAIL KITE: 1 on Lake Arbuckle (Polk Co.) on 27 Oct (DF4) was new for area; banded male and female and unbanded male at Orlando Wilderness Park in Nov (DF3, TR1, BP2); several other reports of birds in N portion of range, apparently avoiding drought conditions in S Florida.

MISSISSIPPI KITE: late adult at M.K. Ranch (Gulf Co.) on 1 Nov (SA1).

SHARP-SHINNED HAWK: 66 at Boot Key on 6 Oct (WH1).

COOPER'S HAWK: high numbers reported from the Keys this fall; 10 seen from 6 Oct to 30 Nov (WH1); 8 other sightings reported. One crashed into a window on Islamorada on 12 Oct while chasing a White-crowned Pigeon (both died).

BROAD-WINGED HAWK: ca. 200 soaring over Crews Lake (Pasco Co.) on 16 Sep (DR2); 295 at Marquesas Keys on 6 Oct (TW1); 350 at Key Largo on 6 Nov (*fide* MC1).

SHORT-TAILED HAWK: light morph S of Masaryktown (Hernando Co.) on 13 Sep (PY1), rare for area; 3 at Boot and Big Pine Keys from 6 Oct to 30 Nov (m. obs.).

SWAINSON'S HAWK: 3 at Key Largo and 1 at Marathon (Monroe Co.) on 27 Oct (HR1); 1 at Big Pine Key on 28 Oct; 10 at Big Pine Key on 4 Nov (WH1); 12 at Plantation Key on 6 Nov (WH1). The Plantation Key birds were moving NE up the Keys and included 2 recognizable birds also seen on 4 Nov on Big Pine Key. Fourteen at a plowed field in Dade Co. on 24 Nov (*fide* MC1).

GOLDEN EAGLE: 3 adults S of Wewahitchka (Gulf Co.) on 14 Nov (SA1), a very unusual number.

AMERICAN KESTREL: 2 high counts reported: 120+ from Upper Keys to Boot Key on 19 Oct (WH1); 154 along Hwy. 27 between Homestead and Winter Park on 30 Oct (HR1).

MERLIN: 37 at Boot Key on 6 Oct (WH1), very high count.

PEREGRINE FALCON: 1 at Dead Lakes (Calhoun Co.) on 18 Sep (MH4), early and inland; 45 at Boot Key on 6 Oct and 35 at Boot Key on 13 Oct (WH1), including 18 seen simultaneously; rare inland record from SW Gainesville on 5 Oct (AK1); many reports from downtown Jacksonville from Oct to Nov where pair wintered last year; 2 and 3 at St. George Island (Franklin Co) on, respectively, 6 and 13 Oct (DS1).

LESSER GOLDEN PLOVER: 17 at Zellwood (Orange Co.) on 20 Sep (HR1), good number.

SNOWY PLOVER: 36 at Honeymoon Island SRA (Pinellas Co.) on 1 Nov (HR1), good number.

PIPING PLOVER: 1 at St. Marks NWR on 2 Sep (BN2, BN1, WN1) was unusual for area; counts of 13 at Ohio Key (Monroe Co.) on 27 Oct (HR1) and 40 at Honeymoon Island SRA on 1 Nov (RH1) were largest of period.

AMERICAN AVOCET: 1 at M.K. Ranch (Gulf Co.) on 18 Nov (BN2, SA1) was rare for area; high count of 348 at phosphate mines (Polk Co.) on 25 Nov (PF1).

BLACK-NECKED STILT: albino at Zellwood (Orange Co.) on 1 Sep (GB1).

LONG-BILLED CURLEW: 1 at Ft. Myers Beach on 5 Sep (VM1).

SANDERLING: 1 at phosphate mines (Polk Co.) on 5 Nov (BC2), uncommon in area.

BUFF-BREASTED SANDPIPER: 1 near entrance to Everglades NP on 15 to 16 Sep (PS1); high count of 21 at Zellwood (Orange Co.) on 20 Sep (HR1).

POMARINE JAEGER: 1 at Ponce Inlet (Volusia Co.) on 24 Oct (HR1), rarely seen.

FRANKLIN'S GULL: 2 first basic plumage birds at Ponce Inlet (Volusia Co.) on 24 Oct (HR1); 1 at Rickenbacher Causeway (Dade Co.) on 27 Oct (LA1, BA1); 1 adult at Honeymoon Island SRA (Pinellas Co.) on 6 Nov (DG2); first basic plumage bird at Tierra Verde (Pinellas Co.) on 6 Nov (LA1); first basic plumage bird at Port St. Joe (Gulf Co.) on 23 Nov (LA1, BA1); first basic plumage bird at Santa Rosa Island on 27 Nov (RD1, WF1).

COMMON BLACK-HEADED GULL: 1 at Naples on 17 Nov (*fide* MC1).

LESSER BLACK-BACKED GULL: 2 adults at Wards Bank (Duval Co.) on 18 Oct and 1 adult on 20 Oct (LB1); adult returned to Reddington Long Pier (Pinellas Co.) on 26 Oct (KN2, DG2), at least 1 has been seen here for past 8 or 9 years.

CASPIAN TERN: 415 at phosphate mines (Polk Co.) on 1 Sep (PF1), 4-times the usual number.

SANDWICH TERN: 478 at Honeymoon Island SRA (Pinellas Co.) on 26 Sep (KN2, DG2), locally high number.

COMMON TERN: 1020 at Honeymoon Island SRA (Pinellas Co.) on 26 Sep (KN2, DG2), locally high number.

FORSTER'S TERN: high count of 550 at phosphate mines (Polk Co.) on 16 Oct (CG1).

BLACK SKIMMER: high count of 1117 at phosphate mines (Polk Co.) on 14 Oct (PF1); another high count of 764 at Honeymoon Island SRA (Pinellas Co.) on 29 Nov (KN2, DG2).

WHITE-WINGED DOVE: 1 in Key West on 29 Sep (JO1), unusual location; 1 at Gulf Breeze (Santa Rosa Co.) on 25 Oct (WD1) and 1 at Gulf Breeze on 2 Nov (LD2), casual for this area.

BLACK-HOODED PARAKEET: flock of 70 in Lassing Park (Pinellas Co.), high number (SB1, MT1).

BLACK-BILLED CUCKOO: 1 at Highlands Hammock State Park (Highlands Co.) on 21, 22 Sep (CF1, DF1); 1 at Gulf Breeze (Santa Rosa Co.) on 28 Oct (LD1, WD1), late for area.

GROOVE-BILLED ANI: 1 at Ft. Walton Beach on 28 Sep (JS4) was somewhat early.

BURROWING OWL: 1 at Big Pine Key in mid-Oct (MB2) was unusual as sightings beyond 7-mile bridge are rare.

CHIMNEY SWIFT: 5000 in Tallahassee on 15 Oct (DM2), good concentration.

BUFF-BELLIED HUMMINGBIRD: 1 at Fort Lauderdale on 19 Nov (*fide* MC1), in same yard as last winter.

RUBY-THROATED HUMMINGBIRD: high numbers reported from Western Panhandle and Big Bend area this fall; 15-20 present at certain feeders from mid-Sep through early Oct.

RUFOUS HUMMINGBIRD: imm. male in rural Alachua Co. from 10 Oct to 22 Nov (RR2, m. obs.); female at Mary Krome Sanctuary (Dade Co.) on 5 Nov (VE1).

Selasphorus spp.: 2 (probably Rufous) in Gainesville from 15 Nov to end of period (DF3).

ACADIAN FLYCATCHER: 1 at Deering Estate (Dade Co.) from 16 to 17 Oct (VE1).

YELLOW-BELLIED FLYCATCHER: 1 at Saddle Creek Park (Polk Co.) on 18 Oct (PF1), very rare; 1 banded at Casey Key (Sarasota Co.) on 13 Oct (SS1, AS1).

Empidonax spp.: 2 other reports of unusual *Empidonax* flycatchers. A possible Traill's Flycatcher was observed near Wakulla Springs SP on 1 Sep (BN2, NW1). Plumage was most akin to Traill's, but the call was more akin to Yellow-bellied Flycatcher. A silent *Empidonax* was seen on 22 Nov in rural Alachua Co. (JH2), a late date for any *Empidonax* in this region.

EASTERN PHOEBE: 1 in Pensacola on 15 Sep (PT1) was early.

VERMILION FLYCATCHER: adult male at St. Marks NWR on 25 Nov (DG1, LH1, m. obs.).

GREAT CRESTED FLYCATCHER: late bird in rural Alachua Co. on 28 Nov (JH2).

EASTERN KINGBIRD: 113 at Fort DeSoto Park (Pinellas Co.) on 16 Sep. (KN2), locally high fall count.

GRAY KINGBIRD: 1 in Gainesville on 3 Oct (MJ1), rare inland sighting.

SCISSOR-TAILED FLYCATCHER: 3 in Key West (JO1) and 1 in Key Largo (WH1) ca. 28 Oct; 1 at St. Marks NWR on 4 Nov (DS1); 6 in Key West on 4 Nov (JO1); 6 near Homestead (Dade Co.) on 9 Nov, and 7+ in same area on 11 Nov (PS1).

WESTERN KINGBIRD: 1 at St. George Island SP (Franklin Co.) on 13 Oct (DS1) 7 at Marathon (Monroe Co.) on 27 Oct (HR1); 4 in Key West on 4 Nov (JO1); 12+ around Homestead (Dade Co.) on 11 Nov (PS1).

PURPLE MARTIN: ca. 1100 on wires throughout the Keys on 29 Aug (JO1), largest group totalled 200; flock of ca. 12 over Crews Lake (Pasco Co.) on 19 Nov (DR2), very late date.

BANK SWALLOW: adult over NW Pasco County on 19 Nov (PY1), late date for area.

CLIFF SWALLOW: 1 at Zellwood (Orange Co.) on 2 Sep (HR1); 1 at St. Marks NWR on 2 Sep (BN2); 1 at Saddle Creek Park (Polk Co.) on 19 Oct (PF1, DF1, TP1).

BROWN CREEPER: 1 in St. Petersburg on 20 Sep (JH3), 2nd county record and very early; early report also at St. Marks NWR on 28 Oct (DE2, BN2).

BEWICK'S WREN. 1-2 near Marianna (Jackson Co.) from 9 to 15 Nov (LH1, m. obs.).

WINTER WREN: 1 at Honeymoon Island SRA (Pinellas Co.) on 27 Oct (DG2), 2nd county record.

GOLDEN-CROWNED KINGLET: 1 at Sawgrass Lake Park (Pinellas Co.) from 23 Nov (BP3) through mid-Dec, rare for area.

GRAY-CHEEKED THRUSH: total of 5 banded at Casey Key (Sarasota Co.) from 13 to 20 Oct (SS1, AS1), good number.

SWAINSON'S THRUSH: highest count was 10 at Saddle Creek Park (Polk Co.) on 6 Oct (HR1).

WOOD THRUSH: only 3 migrants reported from central Florida, lower than usual; 11 at Bonner Park (Pinellas Co.) on 14 Oct (KN2), locally high count.

THICK-BILLED VIREO: remained at Bill Baggs Cape Florida SRA (Dade Co.) from 26 Aug to 21 Sep (PS1, MC1).

YELLOW-THROATED VIREO: 1 at Long Key on 6 Sep (WH1); 1 at Deering Estate (Dade Co.) on 17 Nov (VE1).

WARBLING VIREO: 1 at Long Key on 19 Sep (WH1), viewed from short range; 1 (possibly 2) at Bill Baggs Cape Florida SRA (Dade Co.) on 24 Sep (PS1); rare during fall migration.

PHILADELPHIA VIREO: 1 at Paynes Prairie State Preserve (Alachua Co.) on 5 Oct (WH2); 2 at Cedar Key (Levy Co.) on 7 Oct (BC2, LC2, BB2, DF3, DH2); 1 at St. Marks NWR on 12 Oct (GP1); 1 at Wakulla Beach (Wakulla Co.) on 13, 14 Oct (BP1, DG1, m. obs.); 1 at Saddle Creek Park (Polk Co.) on 18, 28 Oct (PF1); 1 at Deering Estate (Dade Co.) on 19 Oct (VE1, MW1).

RED-EYED VIREO: 8 at Bill Baggs Cape Florida SRA (Dade Co.) on 24 Sep (PS1), high count for area.

BLUE-WINGED WARBLER: 1 at Deering Estate (Dade Co.) on 30 Nov (VE1), very late.

GOLDEN-WINGED WARBLER: numerous reports of 1-2 individuals from mid-Sep through mid-Oct indicate that numbers were high this fall.

Vermivora hybrids: 1 hybrid "Brewster's Warbler" at Bonner Park (Pinellas Co.) on 14 Oct (KN2); 1 hybrid "Lawrence's Warbler" at Newnan's Lake (Alachua Co.) on 23 Sep (CL1, RR3).

ORANGE-CROWNED WARBLER: 1 at Newnan's Lake (Alachua Co.) on 6 Sep (BM3, JD3), very early.

NASHVILLE WARBLER: 1 in Seminole (Pinellas Co.) on 20-21 Sep (JF3, BP3, m. obs.); 2 at Bill Baggs Cape Florida SRA (Dade Co.) on 8 Oct (PS1); 1 ate persimmons at Melbourne Village (Brevard Co.) on 17 Oct (SH1); 1 at Bill Baggs Cape Florida SRA (Dade Co.) on 27 Nov (LA1, JB1), late.

YELLOW-RUMPED WARBLER: 1 at Ft. DeSoto Park (Pinellas Co.) on 17 Sep, and 2 on 18 Sep (MW2, LA1), very early dates.

BLACK-THROATED GREEN WARBLER: 1 banded at Casey Key (Sarasota Co.) on 14 Nov (SS1, AS1).

BLACKBURNIAN WARBLER: 9 in Melbourne Village (Brevard Co.) on 17 Sep (SH1, BH2), high number; 1 in Tallahassee on 12 Nov (BN2) was late.

BLACKPOLL WARBLER: 3 at Bill Baggs Cape Florida SRA (Dade Co.) on 28 Oct (LA1, BA1, JB1), rare in fall.

CERULEAN WARBLER: several reports from Big Bend area from late Aug through early Oct; 3 in Bonner Park (Pinellas Co.) on 19 Aug (KN2, BP3, DG2), highest count for this area.

SWAINSON'S WARBLER: 1 at Melbourn Village (Broward Co.) on 18 Sep (SH1, BH2); total of 6 at Bonner Park (Pinellas Co.) from 15 Sep to 14 Oct (KN2, BP3, DG2).

MOURNING WARBLER: 1 imm. at Cedar Key on 6 Oct (WH2, SF2); 1 at Deering Estate (Dade Co.) on 17 Oct (VE1).

HOODED WARBLER: 1 in Melbourne Village (Brevard Co.) from 18 Sep through end of Nov (SH1, BH1); this straggler appeared to be attracted to an aviary.

WILSON'S WARBLER: many more reports than usual from all around the state. The most unusual report was a small flock of 10 near Wewahitchka (Gulf Co.) on 21 Sep (SA1). Other reports include: 1 female at Ft. DeSoto Park (Pinellas Co.) on 17 Sep (LA1); 1 male at Key West on 20 Sep (JO1); 1 male at Castello Hammock Park (Dade Co.) on 19 Oct (PS1); and 1 at Saddle Creek Park (Polk Co.) on 17 Oct (HR1) and 3 Nov (PF1).

CANADA WARBLER: more reports than usual: 1 in Bonner Park (Pinellas Co.) on 17 Sep (KN2, BP3); 1 at Deering Estate (Dade Co.) on 20 Sep (VE1); 1 banded at Casey Key (Sarasota Co.) on 6 Oct (SS1, AS1), recaptured on 8, 9, and 12 Oct.

YELLOW-BREASTED CHAT: 1 banded at Casey Key (Sarasota Co.) on 22 Sep (SS1, AS1); 1 at Honeymoon Island SRA (Pinellas Co.) on 25 Sep (KN2, BP3, DG2); 1 at Bill Baggs Cape Florida SRA (Dade Co.) on 29 Sep. (PS1); 1 at Merritt Island NWR on 7 Oct (HR1).

WESTERN TANAGER: female at Ft. DeSoto Park (Pinellas Co.) on 10 Nov (LA1, BA1, m. obs.).

ROSE-BREASTED GROSBEAK: 2 late reports: 2 females at M.K. Ranch (Gulf Co.) on 3 Nov (RI1); pair stayed at feeder in Panama City from 21 Oct to 10 Nov (BM4).

BLUE GROSBEAK: female near M.K. Ranch (Gulf Co.) on 3 Nov (RI1); 1 in S Jacksonville on 14 Nov (JC2); late reports.

DICKCISSEL: 1 in Winter Park (Orange Co.) on 11 Oct (HR1).

CLAY-COLORED SPARROW: more reports than usual: 1 at Boot Key on 17 Oct (WH1); 1 at Bill Baggs Cape Florida SRA (Dade Co.) on 21 Oct (*fide* MC1); 1 at Honeymoon Island SRA (Pinellas Co.) on 27 Oct (DG2); 1 imm. near Lake Alfred (Polk Co.) on 23, 24 Nov (PT2, CG1), 2nd county record.

LARK SPARROW: several reports: 1 at Plantation Key (Monroe Co.) on 5 Sep (RS2); 1 at St. Marks NWR on 20 Sep (BN2, JB4); 1 adult W of Avon Park (Highlands Co.) on 9 Oct (DF1); 1 at Cedar Key (Levy Co.) on 10, 11 Oct (DH2, DF3).

LARK BUNTING: 1 at St. Marks NWR on 9 Sep (BN2, m. obs.), viewed at close range.

SAVANNAH SPARROW: 3 at Key West on 18 Oct (JO1), rare for area.

SWAMP SPARROW: 1 banded at Casey Key (Sarasota Co.) on 4 Nov (AS1, SS1), rare for area.

GRASSHOPPER SPARROW: 5 north of Lake Alfred (Polk Co.) on 23, 24 Nov. (PT2, CG1).

FOX SPARROW: 1 at M.K. Ranch (Gulf Co.) on 18 Nov (BN2, SA1) was early.

LINCOLN'S SPARROW: 1 in Glades Co. on 16 Nov (DF1); 1 N of Lake Alfred (Polk Co.) on 23, 24 Nov (PT2, CG1); rarely observed.

WHITE-THROATED SPARROW: somewhat early report from Tallahassee (LS1) on 24 Sep.

WHITE-CROWNED SPARROW: 2 at Ft. Pickens SP (Escambia Co.) on 24 Sep (RD1), early; 1 imm. at St. Marks NWR on 4 Nov (DS1); large flock of ca. 12 at M.K. Ranch (Gulf Co.) on 18 Nov (BN2, NW1, SA1); 4 imms. N of Lake Alfred (Polk Co.) on 24 Nov (PT2, CG1).

YELLOW-HEADED BLACKBIRD: many reports: imm. male appeared at feeder in Key West on 12 Sep and was joined by a female on 14 Sep and by another imm. male on 29 Sep

(JO1); all stayed till 6 Oct. At least 2 (1 female, 1 imm. male) on Lake Seminole (Pinellas Co.) from 11 Sep to 3 Oct (KN2); 1 female at Honeymoon Island SRA (Pinellas Co.) on 10 Oct (DG2); imm. at Cedar Key (Levy Co.) from 28 Sep to early Oct (DH2); imm. at a roost in Bay Co. on 15 Oct; 3 imms. near Lynn Haven (Bay Co.) in 2nd week of Oct (AH2); 1 in W Dade Co. on 2 Nov. (*fide* MC1).

Brewer's Blackbird: 7 at Ft. Walton Beach sewage treatment plant on 12 Nov (RD1, JP1); rare for area.

Shiny Cowbird: 3 males and 3 females at feeder in Key West on 11 Sep (JO1); 4 (2 females, 2 males) at Lake Seminole (Pinellas Co.) from 2 Oct through end of period (KN2, m. obs.); male at Bay Point (Bay Co.) on 28 Oct (TM1); male in St. Petersburg on 4 Nov (LH1, JH3), first "winter" record for area.

Brown-headed Cowbird: 1 male in Key West on 29 Aug (JO1), increasing in S Florida.

House Finch: increased numbers reported from many areas of N Florida (Ft. Walton Beach, Pensacola, Tallahassee); 30+ near Marianna (Jackson Co.) on 23 Nov (LH1), first large concentration reported for this area.

Purple Finch: 1 at Niceville (Okaloosa Co.) on 26 Oct (BM5), first Oct record for area; 75+ at Blackwater Fish Hatchery (Santa Rosa Co.) on 28 Nov (MH4), high count.

Observer abbreviations: Brooks Atherton (BA1), Harry Anderson (HA1), Lyn Atherton (LA1), Sybil Arbery (SA1), Bob Brown (BB2), Jocie Baker (JB1), Jay Bass (JB4), Linda Bremer (LB1), Marge Brown (MB2), Sandy Bogert (SB1), Buck Cooper (BC2), Julie Cocke (JC2), Linda Cooper (LC2), Mort Cooper (MC1), J. Dorney (JD3), Linda Douglas (LD1), Lucy Duncan (LD2), Robert Duncan (RD1), Susan Dredla (SD2), William Duncan (WD1), Doug Emkalns (DE2), Virginia Edens, (VE1), Clarice Ford (CF1), Don Ford (DF1), Dorothy Fagan (DF3), Dot Freeman (DF4), Joe Fisher (JF1), Judy Fisher (JF3), Paul Fellers (PF1), S. Flamand (SF2), Will Fullilove (WF1), Chuck Geanangel (CG1), Dave Goodwin (DG1), Doug Gagne (DG2), Alene Hayes (AH2), Brian Hope (BH1), Bill Hills (BH2), Dale Henderson (DH2), John Hintermister (JH2), Judi Hopkins (JH3), Larry Hopkins (LH1), Michael Hill (MH4), Shirley Hills (SH1), Wayne Hoffman (WH1), W. Henderson (WH2), Richard Ingram (RI1), M. Jennings (MJ1), Adam Kent (AK1), Bruce Kittredge (BK1), Helene Kings (HK1), Marion Kittredge (MK1), Carmine Lanciani (CL1), James Layne (JL1), Barbara Muschlitz (BM3), B. Messer (BM4), Bob McKenney (BM5), David Mehlman (DM2), Tony Menart (TM1), Vincent McGrath (VM1), Barbara Neville (BN1), Bruce Neville (BN2), Kris Nelson (KN2), Wayne Neville (WN1), Joe Ondrejko (JO1), Becky Payne (BP2), Bruce Parkhurst (BP3), Gail Parsons (GP1), James Pfeiffer (JP1), Tom Palmer (TP1), Bob Reid (BR1), Don Robinson (DR2), Harry Robbinson (HR1), Rufus Rose (RR2), Robin Ritland (RR3), Ted Robinson (TR1), Annette Stedman (AS1), Daan Sandee (DS1), Jack Spey (JS4), Lavinia Short (LS1), P. William Smith (PS1), Rick Sawickin (RS2), Stanley Stedman (SS1), Mark Turner (MT1), Phil Tetlow (PT1), Pete Timmer (PT2), Carol Ware (CW1), Don Ware (DW1), Mickey Wheeler (MW1), Marge Wilkinson (MW2), Noel Wamer (NW1), Robin Wills (RW2), Tom Wilmers (TW1), Paul Young (PY1).

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INFORMATION FOR CONTRIBUTORS

The Florida Field Naturalist is a fully refereed journal emphasizing biological field studies and observations of vertebrates, especially birds, in and near Florida and the nearby West Indies. It welcomes submission of manuscripts containing new information from these areas. Please consult recent issues for style, and Vol. 18, No. 1 for detailed information. Submit manuscripts for consideration to the editor Peter G. Merritt. Monograph-length manuscripts may be submitted for consideration to the Editor of Special Publications John William Hardy. Send books and other materials for review to Associate Editor Sheila A. Mahoney. Send copies of recent literature on Florida birds to Special Editor Fred E. Lohrer. For preliminary assistance regarding submission of manuscripts dealing with bird distribution and rarities contact Associate Editor Howard P. Langridge. Reports of rare birds in Florida should also be submitted to the FOS Records Committee Secretary Jocie Baker. For preliminary assistance regarding submission of scientific, technical, or behavioral contributions contact Associate Editor Richard T. Paul.

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DISTRIBUTION AND ABUNDANCE OF NESTING LEAST TERNS AND BLACK SKIMMERS IN NORTHWEST FLORIDA

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Abstract.—A survey of nesting Least Terns (*Sterna antillarum*) and Black Skimmers (*Rhynchops niger*) in northwest Florida was conducted from 22 May to 14 June, 1990. Of 76 sites that were active in one or more of the last five years, 45 (59%) supported nesting terns or skimmers in 1990. Of 42 Least Tern colonies containing an estimated 2364 nests, nine colonies were on beaches, nine on altered substrates such as dredge spoil, and 24 on roofs of buildings. Black Skimmers nested with terns in nine of the colonies and in three other colonies they nested alone. The 12 colonies contained 386 Black Skimmer nests, but 89% of the nests were in just five colonies. Two Black Skimmer colonies were on natural beaches, three on artificial substrates, and seven on roofs. Many more colonies and nests of both species were found in 1990 than in earlier surveys, but differences in survey intensity make population trends difficult to identify.

Least Terns (*Sterna antillarum*) and Black Skimmers (*Rhynchops niger*) regularly nest along the northern Gulf coast of Florida, but the number and size of their breeding colonies has not been well documented (Clapp et al. 1983, Spendelow and Patton 1988). Downing (1973) found only four colonies of terns and skimmers in northwest Florida in 1973, Fisk (1978) reported only two colonies on gravel-covered roofs as of 1976, and Clapp et al. (1983) identified only two colonies from 1976 to 1978. None of these surveys was comprehensive and, therefore, they probably underestimated the size of the breeding populations (Spendelow and Patton 1988).

The lack of a recent or intensive survey of Least Tern and Black Skimmer populations in northwest Florida provided the impetus for conducting the 1990 survey described here. The objective of this study was to determine the current distribution and abundance of nesting Least Terns and Black Skimmers and to compare this with data from past years. Surveys for estimating population size are particularly important for species such as the Least Tern and Black Skimmer because their

nesting colonies are frequently disturbed by humans or the habitat developed for other uses. Without a baseline assessment of abundance and distribution, it is impossible to objectively determine the relative status of populations of these species, to monitor trends in their population sizes, or to justify conservation actions.

Methods

Between 22 May and 14 June 1990, observers visited known locations of nesting colonies of Least Terns and Black Skimmers in northwest Florida from Wakulla County west to the Alabama border (Fig. 1). The sites surveyed were locations where I had observed or received reports of either species nesting during any year from 1985 to 1990. Because Least Tern and Black Skimmer colonies may change size or location within a nesting season (Nisbet 1973; Burger 1982, 1984; Massey and Fancher 1989), most surveys were conducted over a short period (1-4 June) near the peak of Least Tern nesting activity. This prevented double-counting of birds that renested at other sites during the season. Surveying sites simultaneously at the peak of nesting also reduced bias caused by surveying some sites when the numbers of nests were below peak levels. Although survey dates ranged from 22 May to 14 June because of logistical problems, only five active colonies were surveyed outside the 1-4 June period (Table 1).

Observers attempted to count all nests, adults, and chicks in a colony; however, this was not always possible. Because the number of adult birds present in a colony at a given time usually does not equal the number of breeding pairs in the colony (Nisbet 1973), observers tried to determine the number of nests in each colony. Depending upon the size of a colony and access to it, one of three survey methods was employed to determine the number of nests present. Where feasible, the number of nests was determined from the periphery of the colony by counting the number of birds sitting on nest scrapes (i.e., in incubating posture). In colonies where birds flushed, the observer walked through the colony and counted scrapes containing eggs or chicks. I classified these complete surveys as censuses. In some large colonies, a subset or sample of nests was counted and extrapolated to the entire nesting area. These surveys were classified as samples. Finally, at some colonies, particularly those on roofs with no access, the observer could not see nests nor incubating birds but the behavior of adult birds at the site indicated nests were present. In such cases, the number of nests was derived solely from the number of adults observed. Totals from these rather limited observations were classified as estimates.

Results

Forty-five (59%) of the 76 nesting sites surveyed in nine counties contained nests of Least Terns or Black Skimmers in 1990 (Fig. 1, Table 1). The remaining 31 (41%) sites, which had been active in at least one year since 1985, were vacant in 1990 (Fig. 1). Least Terns nested at 42 of the sites in 1990 and the number of nests/colony ranged from 1 to 704, with a mean of 56.3 nests/colony. Black Skimmers nested at only 12 sites, including two sites with just one skimmer nest. Least Terns nested along with Black Skimmers at nine of the sites, and terns had nested at the other three sites in past years (Gore, unpubl. data). The number of Black Skimmer nests at the 1990 colonies ranged from 1 to 208, with a mean of 32.2 nests/colony.

Figure 1. Distribution of active (•) and inactive (∘) sites of Least Tern and Black Skimmer nesting colonies in northwest Florida in 1990.

Eleven (24%) of the active colonies were on natural beach sites, while nine (20%) were on dredged material, land cleared for construction, road right-of-way, or other altered habitats, and 25 (56%) were on roofs of buildings (Table 1). Of the 42 colonies containing Least Terns, nine (21%) were on beaches, nine on altered substrate, and 24 (57%) on roofs. Two colonies containing Black Skimmer nests were on beaches, three on altered substrate, and seven on roofs.

DISCUSSION

When compared with earlier data from northwest Florida (Clapp et al. 1983, Downing 1973, and Fisk 1978), the 1990 survey results indicate that the breeding population of Least Terns increased markedly over the last 10 to 15 years, at least relative to the Black Skimmer population. Clapp et al. (1983) reported only two ground colonies (250 breeding pairs) of Least Terns and three ground colonies (200 breeding pairs) of Black Skimmers in northwest Florida from 1976 to 1978, but the current survey found 1012 Least Tern nests in 18 ground colonies and 288 Black Skimmer nests in five ground colonies. However, because the 1976 to 1978 survey was much larger in scope and apparently not intensive in its coverage (Clapp et al. 1983, Spendelow and Patton 1988), it is impossible to say whether observed differences represent an increase in the number of nesting birds or simply differences in the intensity of the surveys. Jackson and Jackson (1985), using more consistent observations, found that Least Tern populations in Mississippi had increased dramatically starting about 1976, which suggests that the apparent increase in Least

Table 1. Location and size of Least Tern and Black Skimmer nesting colonies in northwest Florida in 1990.

Colony location	Latitude	Longitude	Survey date	No. of nests: Terns	No. of nests: Skimmers	Survey type*	Habitat
Escambia County							
Fort Pickens East	30°19.0′	87°12.0′	1 June	4	0	Census	Beach
Pensacola Beach Bridge	30°20.0′	87°08.0′	1 June	12	25	Census	Other
Perdido Key East	30°19.0′	87°19.5′	4 June	23	0	Census	Beach
Big Lagoon Spoil	30°18.5′	87°25.5′	4 June	40	0	Estimate	Other
Delchamps-Inerarity Point	30°19.0′	87°25.5	2 June	125	0	Sample	Roof
Delchamps-Pensacola West	30°24.0′	87°20.5′	2 June	20	0	Census	Roof
Sears-University Mall	30°30.0′	87°13.5′	4 June	244	1	Census	Roof
Pensacola Port Authority	30°24.0′	87°12.5′	4 June	16	6	Census	Roof
Winn Dixie-Pensacola	30°24.0′	87°20.5′	2 June	53	0	Census	Roof
Crown Laundry-Pensacola	30°25.8′	87°13.1′	2 June	72	19	Census	Roof
Santa Rosa County							
Navarre Beach Causeway	30°23.0′	86°51.5′	4 June	113	42	Census	Other
S. C. Railroad Spoil Island	30°32.0′	87°08.0′	4 June	35	0	Estimate	Other
Six Flags Revco-Milton	30°37.0′	87°02.5′	4 June	30	0	Census	Roof
Okaloosa County							
Holiday Island-Noriego Point	30°23.5′	86°30.5′	1 June	0	11	Census	Beach
Okaloosa Island-East Pass	30°23.2′	86°31.0′	3 June	12	0	Census	Beach
Sun Plaza-Ft. Walton Beach	30°25.5′	86°38.5′	1 June	12	0	Census	Roof
Inlet Reef Condominium	30°23.0′	86°29.8′	4 June	47	0	Census	Roof
Sears-Santa Rosa Mall	30°25.0′	86°39.4′	1 June	17	0	Census	Roof
Choctawhatchee High School	30°27.0′	86°37.0′	1 June	50	1	Census	Roof
Walton County							
Eastern Lake Inlet	30°18.0′	86°05.5′	1 June	1	0	Census	Beach
Delchamps-Miramar Beach	30°22.5′	86°21.5′	1 June	225	0	Census	Roof
Bay County							
Crooked Island East	30°00.0′	85°32.5′	8 June	0	2	Census	Beach
Lake Powell Inlet	30°16.0′	85°59.0′	4 June	15	0	Estimate	Beach
Mariner West Lot	30°09.0′	85°46.0′	22 May	10	0	Census	Other
Naval Coastal Systems 110	30°10.5′	85°45.0′	14 June	7	0	Census	Roof

Table 1. (continued)

Colony location	Latitude	Longitude	Survey date	No. of nests: Terns	No. of nests: Skimmers	Survey type*	Habitat
Naval Coastal Systems 319	30°10.5′	85°45.0′	5 June	25	0	Census	Roof
Gayfers-Panama City	30°11.0′	85°43.5′	1 June	0	27	Census	Roof
Walmart-Parker	30°08.5′	85°20.5′	1 June	50	43	Sample	Roof
Vacant Winn Dixie-Parker	30°08.5′	85°20.5′	1 June	44	1	Sample	Roof
Kmart-Parker	30°08.5′	85°20.5′	1 June	20	0	Sample	Roof
Panama City Outlet Mall	30°11.0′	85°43.6′	3 June	18	0	Census	Roof
Surfside Middle School	30°42.1′	85°49.8′	1 June	200	0	Sample	Roof
Winn Dixie/TG&Y-Panama City	30°11.2′	85°46.0′	1 June	20	0	Estimate	Roof
Sports Park-Panama City Beach	30°42.7′	85°52.4′	4 June	10	0	Estimate	Roof
Lo-Mark Building-Parker	30°08.7′	85°25.5′	1 June	8	0	Estimate	Roof
Merritt Brown School	30°14.5′	85°33.8′	2 June	10	0	Estimate	Roof
Gulf County							
Highland View	29°50.0′	85°18.5′	1 June	4	0	Estimate	Beach
Franklin County							
Alligator Point	29°54.0′	84°25.5′	4 June	7	0	Census	Beach
St. George Causeway	29°42.0′	84°53.0′	1 June	704	208	Census	Other
Carrabelle River Island	29°51.0′	84°40.5′	2 June	10	0	Sample	Other
Carrabelle Beach	29°49.9′	84°41.1′	3 June	8	0	Census	Beach
FSU Marine Lab	29°54.9′	84°30.6′	3 June	1	0	Census	Beach
Leon County							
Mahan Publix-Tallahassee	30°27.5′	84°13.5′	3 June	29	0	Sample	Roof
Wakulla County							
Fiddler's Point	30°01.0′	84°22.0′	2 June	1	0	Census	Other
Stony Bayou-St. Marks N.W.R.	30°07.5′	84°08.5′	28 May	12	0	Census	Other
Total				2364	386		

*Census represents a count of all nests in colony, sample data are extrapolated from observations of a known portion of the colony, and estimates are predicted values based upon potential of the nesting area and observation of an unknown portion of the nesting population.

Tern numbers in northwest Florida may be real. In any case, neither Least Tern nor Black Skimmer populations have declined, as was earlier feared they would (Downing 1973, Fisk 1978).

The causeways to Navarre Beach and St. George Island provide nesting Least Terns and Black Skimmers with protection from mammalian predators and, to a lesser extent, disturbance by humans. Consequently, nesting colonies on the causeways appear to be more successful than at other ground sites. In 1990, the two causeway sites produced 81% of the 1012 Least Tern nests found at ground colonies and 87% of the 288 Black Skimmer nests at ground colonies (Table 1.)

Gravel-covered roofs have become important nesting habitat for Least Terns in northwest Florida, and in 1990 over half of the Least Tern colonies and 57% of the nests were on roofs (Table 1). Fisk (1978) reported only two Least Tern colonies and no Black Skimmers on roofs in northwest Florida as of 1976. Even if Fisk's survey was not comprehensive, the 24 Least Tern colonies found on roofs in 1990 indicate that roof-nesting colonies have increased in number. The presence of colonies on several buildings built since 1976 substantiates this conclusion. Although roof-nesting has apparently been beneficial to Least Tern populations in northwest Florida, not all roof colonies are productive (Fisk 1978, Gore and Kinnison 1991). Furthermore, many of the gravel-covered roofs on which terns nest are being replaced by smooth plastic roofs which the birds cannot use (Gore and Kinnison 1991). Three roofs that supported approximately 150 Least Tern nests in 1989 were re-covered with plastic roofing, and no birds nested on them in 1990. Because most Least Tern colonies and nests in northwest Florida are on roofs, future trends in Least Tern populations may be governed largely by productivity of roof colonies and availability of gravel-covered roofs.

The number of Black Skimmers nesting on roofs in northwest Florida has also certainly increased since Fisk's 1976 survey. Skimmers were first recorded nesting on a roof in Pensacola in 1986 (Gore 1987), although they may have nested there for several years. Nesting skimmers were first observed on roofs in Panama City in 1987 and in Ft. Walton Beach in 1990 (Gore, unpubl. data). This recent increase in roof-nesting and the fact that seven of 12 skimmer nesting sites in 1990 were on roofs suggest that roofs are important nesting habitat for skimmers. However, Black Skimmer nests on roofs typically fail (Greene and Kale 1976, Gore 1987), so the increasing use of roofs by nesting Black Skimmers may indicate a lack of suitable nesting sites on beaches or an attraction to roof-nesting colonies of Least Terns rather than a preference for roofs as nesting habitat.

Because the 1990 survey covered only locations where colonies had been reported rather than all potential nesting habitat, colonies in the most visible locations were more likely to be surveyed. All recent nesting

sites on beaches or coastal spoil islands were probably included in the survey because not only are these colonies conspicuous but virtually all of the beach habitat of northwest Florida was searched for colonies on more than one occasion in recent years by birdwatchers, land managers, or biologists. The large gaps between nesting colonies along the northwest Florida coast (Fig. 1), therefore, probably represent a true absence of colonies rather than incomplete surveys.

Although numerous observers have been identifying new roof colonies in northwest Florida over the past few years, the 1990 survey likely missed some roof colonies. As evidence, two small colonies (Food World #57 in Walton County and Tyndall Base Support Center in Bay County) were found late in the season and, although not included in the survey results, they may have been active throughout the summer. Ground colonies at remote inland sites were even less likely to be detected. Because I knew of no colonies on dredge spoil along the intracoastal waterway, that habitat was not covered by the 1990 survey.

Only experienced observers conducted the surveys and accuracy in estimating colony size likely varied more among the three survey methods than among observers. For example, at one roof colony that was surveyed twice, an "estimate" made from the ground predicted six Least Tern nests were present but a "sample" survey from upon the roof found 44 nests.

Although a single-count survey reduces the chance of double-counting renesting birds, any late-nesting pairs, particularly second-year birds will be missed (Massey and Atwood 1981). In addition, the survey may have slightly underestimated the number of nesting Black Skimmers because they typically initiate nesting later in the season than Least Terns (Jackson et al. 1979) and the number of nests may not have peaked by the 1-4 June survey.

Dire predictions regarding the fate of the Least Tern in Florida (Downing 1973, Fisk 1978) fortunately have not come to pass, but because regular and adequate monitoring was not conducted we can only speculate about recent population trends. I suspect that Least Tern populations have increased, due largely to increased nesting on roofs, and that Black Skimmer populations have been stable. If the distribution and abundance of Least Terns and Black Skimmers are monitored more consistently and frequently, we will have a better understanding of population trends and a clearer view of the conservation actions needed to protect these species.

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PATTERNS OF MORTALITY AMONG COMMON LOONS WINTERING IN THE NORTHEASTERN GULF OF MEXICO

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Abstract.—The mortality of Common Loons (*Gavia immer*) wintering along the northeastern Gulf of Mexico from 1983 to 1988 exhibited several major patterns. First, there was a strong relationship between the timing of mortality and molt. Second, adults experienced higher mortality than sub-adults, but there was no difference in levels of mortality between sexes. Third, the homogeneity of mortality distributions suggests that the same factors influenced mortality from year to year and from site to site. Finally, these factors selectively affected loons, but not other ecologically similar fish-eating species of birds.

Little is known about population regulation in Common Loons (*Gavia immer*), although the reproductive biology of the species has been extensively studied (Vermeer 1973a, 1973b, McIntyre 1975, Ream 1976, Fox et al. 1980, McIntyre 1983). A few studies report mortality of loons resulting from commercial fishing (Vermeer 1973b, Frank et al. 1983), or from pathogens such as botulism (Brand et al. 1983), but there is little understanding of factors leading to post-breeding mortality of young and adult birds. In fact, other than studies of factors affecting brood-reduction at the chick-rearing stage (e.g., McIntyre 1983), little is known about survivorship, recruitment, age-structure, finite rate of increase, or other reproductive parameters of any of the species of loons.

Systematic studies in the form of long-term beached bird surveys (e.g., Simons 1985; Speich and Wahl 1986; Powlesland 1987) can greatly increase our understanding of the processes affecting seabird mortality and ultimately regulating seabird populations. The results of five years of systematic beached bird surveys on the northern Gulf coast of Florida presented here document high levels of winter mortality of the Common Loon, and also suggest a pattern of mortality for the species. In this paper I describe a major Common Loon mortality event in the winter of 1982-1983, document levels of mortality in wintering Common Loons over a subsequent five-year interval, present evidence of a temporal pattern in Common Loon mortality, and address the question of how winter mortality may relate to population regulation in loons.

[1]The author is deceased; the manuscript was submitted and revised by Tom Webber, Florida Museum of Natural History.

Study Area and Methods

The study area includes approximately 150 km of shoreline and coastal habitat in the northeastern Gulf of Mexico (Fig. 1). The area is bounded on the south by Waccasassa Bay, and on the west by the Apalachicola River and its estuary. Major study sites within the area were Dog Island (20 km of beach) on the western edge, Hagens Cove (4 km of beach) in the center, and Seahorse Key (2 km of beach) on the southern edge.

Common Loons generally begin to arrive in the coastal waters of the northern Gulf of Mexico by the third week of October. Numbers gradually increase over the following two-week interval, and migration is essentially complete by the second week of November (Alexander, unpubl. data). I divided the winter season into 17 biweekly intervals extending from the second half of October through the month of June. I censused beaches at Dog Island from 1983 to 1988, at Hagens Cove from 1986 to 1987, and at Seahorse Key from 1986 to 1988. The census routine involved biweekly surveys of the major study sites. Dead and moribund loons were censused or collected systematically from beaches in the study area from 1983 through 1988. Birds that were not collected were removed so that they would not be re-counted.

I placed specimens in a freezer upon collection, and subsequently weighed, measured, and necropsied them. I determined the sex of each specimen and assigned it to an age class (adult vs. juvenile) on the basis of plumage. Juveniles lack the pale spotting on the feathers of the upperparts typical of adult basic plumage (Palmer 1962). Although opinion varies as to the nature and number of sub-adult plumages of the Common Loon (Palmer 1962; Godfrey 1966; J. W. McIntyre, pers. comm.; J. F. Barr, pers. comm.), I decided that the degree of variation in plumages of specimens collected was sufficiently uniform that a bimodal classification was parsimonious (see also Storer 1988).

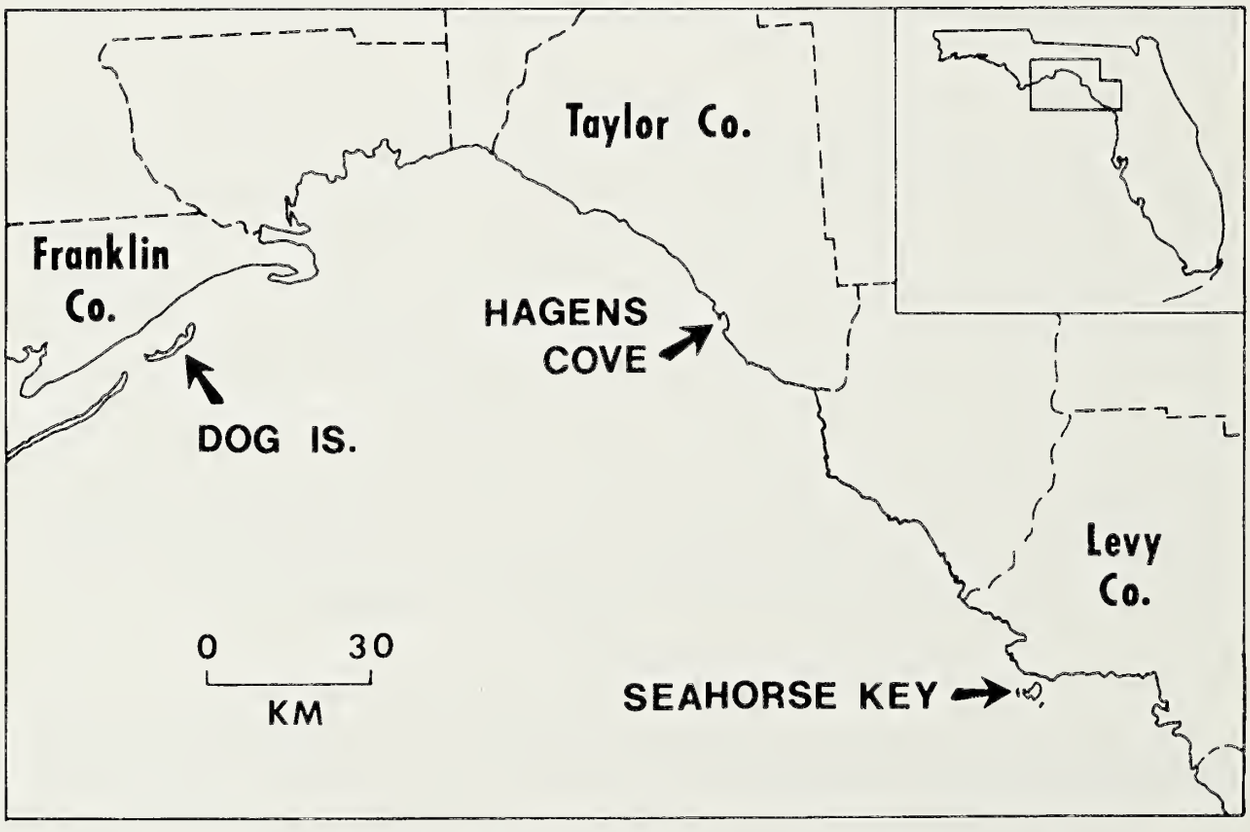

Figure 1. Location of major Common Loon study sites in northern Florida.

RESULTS

I collected a total of 735 dead loons during this study (Table 1). All data sets for major study sites are normally distributed (Kolmogorov-Smirnov test, $P < 0.05$). The distribution of data, both between years and between sites within years, was homogeneous; furthermore, the distributions were not significantly different (Kolmogorov-Smirnov, all pairwise comparisons at $P = 0.05$). A pooled frequency distribution of mortality at the major study sites for all years shows that nearly all loons were collected from the second half of December through the first half of April, with a peak in the second half of February (Fig. 2).

Onset of mortality was generally in the first or second half of January (Fig. 2) and was strongly correlated with the onset of molt ($R = 0.99$). A components-of-variance analysis (two-way ANOVA) of the pooled loon mortality data shows that mortality did not vary significantly between sexes ($P = 0.764$, Table 2), but varied significantly between age classes ($P < 0.001$). Common Loons were the most abundant dead or moribund species at all study sites for all years, and exhibited a rate of mortality greater than all other species combined ($t = 3.384$, $P = 0.0012$).

DISCUSSION

Because the mortality distributions documented here are homogeneous between years as well as between sites within years, it appears that similar factors operate from year to year to affect mortality in the wintering Common Loons of the northeastern Gulf of Mexico. These results suggest a consistent, predictable pattern of mortality. A possible explanation is that the pattern is related to the high cost of plumage replace-

Table 1. Mortality totals for Common Loons and all other species during the study.

Site/year	No. of loons	No. of individuals of other species
Dog Island 1983	497	11
Dog Island 1984	36	14
Dog Island 1985	46	15
Dog Island 1986	23	13
Seahorse Key 1986	15	3
Hagens Cove 1986	12	5
Dog Island 1987	25	11
Seahorse Key 1987	45	14
Hagens Cove 1987	17	5
Seahorse Key 1988	8	3
Dog Island 1988	11	2
Total	735	96

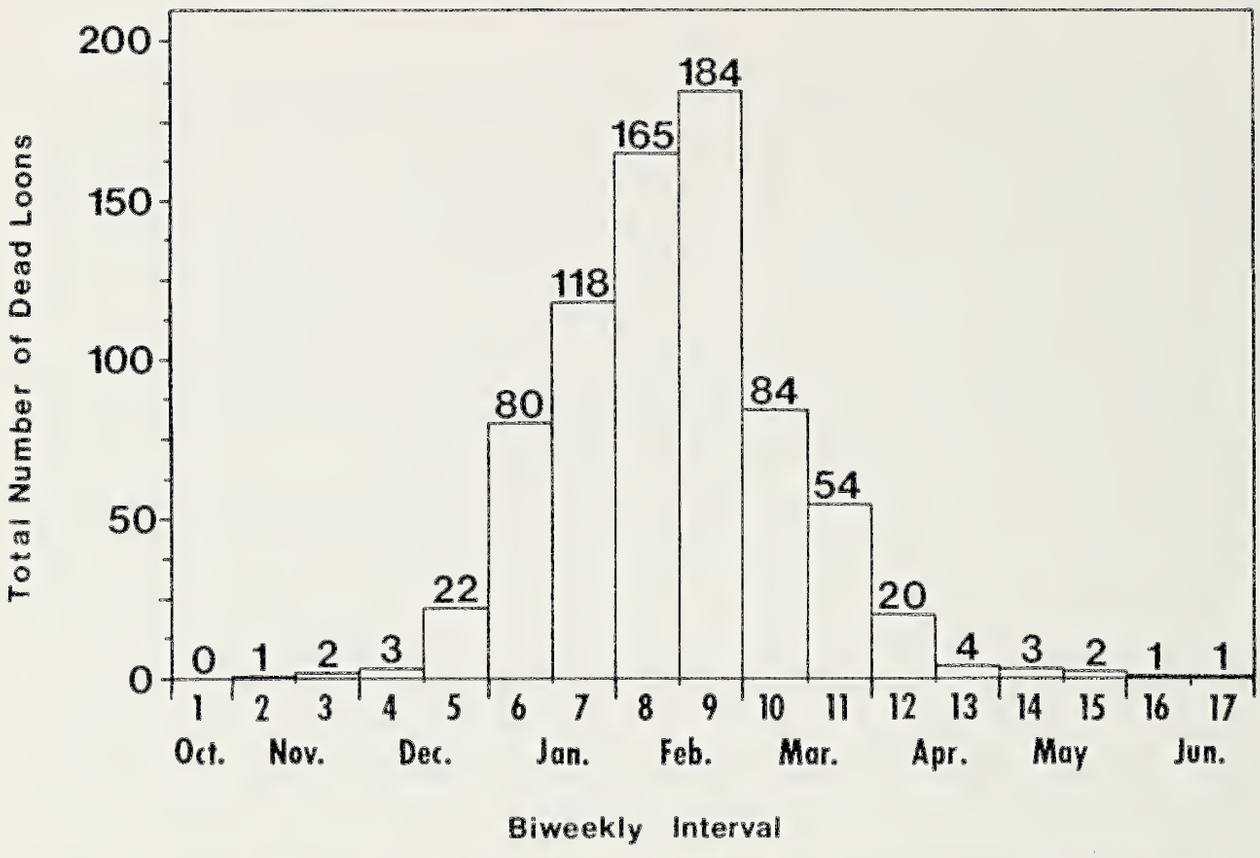

Figure 2. Total number of dead Common Loons per biweekly interval for all years of the study.

ment. Winter mortality as a consequence of the energetic cost of feather replacement may be a basic mode of population regulation in Common Loons.

Other workers have also reported high rates of mortality for the Common Loon (H. W. Kale, II *in litt.*; Simons 1985). Winter mortality is expected for migratory, temperate-zone species (Greenberg 1980, Morse 1980), but generally the effect of mortality is greater on younger age-classes, especially hatching-year birds (von Haartman 1971).

The level of mortality exhibited by the loon population that I studied along the Gulf coast suggests that external factors may also be selectively intensifying processes of winter mortality in these birds. One possible external factor is mercury-induced toxicity. Other researchers have reported significant levels of mercury in loons (Haseltine et al. 1979, Fox et al. 1980, Frank et al. 1983, Barr 1986, McIntyre 1988). Loons dying on my study site exhibited symptoms (emaciation, muscular incoordination) similar to those produced by mercury poisoning (Eisler 1987). Adults would be expected to have levels of mercury higher than those of juveniles because they accumulate it over longer periods. The fact that loons on the Gulf coast died in greater numbers than other fish-eating birds suggests that they may be acquiring mercury on the breeding grounds rather than on the wintering grounds.

Table 2. Common Loon mortality by age and sex.

	Adult		Juvenile	
Site/year	Male	Female	Male	Female
Dog Island 1984	18	12	2	4
Dog Island 1985	23	19	1	3
Dog Island 1986	10	10	2	1
Dog Island 1987	10	11	2	2
Dog Island 1988	4	3	3	1
Seahorse Key 1986	5	7	1	2
Seahorse Key 1987	17	19	5	4
Seahorse Key 1988	3	3	2	0
Hagens Cove 1986	6	4	0	2
Hagens Cove 1987	8	7	1	1
Total	104	95	19	20

Loons suffered especially heavy mortality during the winter season of 1982-83, when an estimated 5,000-10,000 died in the northern Gulf of Mexico (Stroud and Lange 1983, Alexander 1985). Symptoms of affected birds included extreme emaciation, anemia, high parasite burdens, and loss of motor coordination and strength (Stroud and Lange 1983; Alexander 1985; R. E. Lange, pers. comm.; D. J. Forrester, pers. comm.; Alexander, unpubl. data). Freshly-collected specimens showed high levels of mercury (Stroud and Lange 1983, Alexander 1985). Affected birds were also flightless due to complete molt of primaries and secondaries, a condition normal for the species at that time of year (Woolfenden 1967).

These findings point to the possibility that this population of loons may be experiencing a disturbance of normal patterns of survivorship and stable age distribution. To test further these suggestions we need data on the proportions of live juvenile and adult loons to one another and to other species of fish-eating water birds along the Gulf coast, and accurate censuses to allow estimates of the absolute rate of winter mortality in Common Loons.

ACKNOWLEDGMENTS

I am grateful to the Dept. of Zoology and the Florida Museum of Natural History, University of Florida, for the use of equipment and facilities. D. B. McDonald and T. Simons generously provided thoughtful advice; they deserve credit for much of what is useful in this paper, and they are not responsible for any of its shortcomings. I am also grateful to two anonymous referees and to the Editor for their constructive suggestions.

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NOTES

Fla. Field Nat. 19(3): 79-81, 1991.

FIRST NESTING RECORD OF BLACK-BELLIED WHISTLING-DUCK IN CENTRAL FLORIDA

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The Black-bellied Whistling-Duck (*Dendrocygna autumnalis*) has been recorded in central Florida since at least 1973 (F. Montalbano and G. Williams in Edscorn 1977). In recent years there have been frequent sightings, including: an apparently injured adult observed in May 1986 near Wauchula in Hardee County (J. Maddox, pers. comm.); two adults observed 11 July 1989 at IMC Fertilizer Inc.'s Clear Springs Mine near Bartow in Polk County (Feiertag and King in Renken 1989); and a small flock seen at Agrico's Fort Green Mine in Polk County in the summer of 1990 (C. Geanangel, pers. comm.). The only other locations in Florida where this species is currently found are Sarasota County and Palm Beach County (C. W. Biggs, pers. comm.).

On 8 September 1990 at approximately 0730 EDT, Larry McCandless, Jim Sampson, and I visited a clay settling pond just west of CF Industries' Hardee complex in Section 6, Range 24E, Township 35S in northern Hardee County. Shortly after we arrived at the pond, we saw two adult Black-bellied Whistling-Ducks and 12 ducklings (Fig. 1). The young birds were feathered and about three-fourths adult size. They followed the adults during the time we saw them. As we approached the birds, they swam to cover in vegetation (predominantly *Typha* sp.) at the edge of the pond. When we reached the area where the birds were thought to have gone, one adult flew up and repeatedly circled overhead. No attempt was made to locate the nest and we left without seeing the ducklings again that day. The adult pair and the brood of young had previously been seen on 31 August by McCandless and Sampson. The ducks were seen again about a week later by Sampson, who was able to photograph them.

Although the birds appeared to be wild (i.e. they were difficult to approach, lived in an area where there is relatively little human activity, and survived without human assistance), their origin is unknown. Stevenson (1968) noted that presumably escaped birds of this species were breeding more than 20 years ago in Dade County and were seen during breeding season in Broward County. All of the sightings of this species in Florida have occurred since that time. This species has been seen as far north as Zellwood in Orange County (B. Payne in Ogden 1975, J. Hintermeister and J. Horner in Edscorn in 1978, P. Sykes in Paul 1986), sometimes in association with the Fulvous Whistling-Duck (*Dendrocygna bicolor*), which was becoming established in the state during that period. It is possible that the Black-bellied Whistling-Ducks that are being observed in central Florida today

Figure 1. Black-bellied Whistling-Ducks seen in Hardee County.

are the feral descendants of the South Florida birds that were noted by Stevenson and later discussed by Owre (1973). However, there is nothing in the literature to suggest that there was any effort to keep track of the movement of those birds through banding or some other means, so it may be impossible to confirm this connection.

Lyn Atherton (pers. comm.) suggested another possibility in connection with the sudden appearance beginning in 1981 (Atherton and Atherton 1983) of a flock of as many as 35 Black-bellied Whistling-Ducks in Sarasota County, about 40-50 km southwest of the most recent records. She suggested that there may have been a trans-Gulf movement from Mexico or Texas that coincided with a northward range expansion during the previous decade noted by Emmanuel (1982). A mass movement of a related species, the Fulvous Whistling Duck, from Texas to Florida has been described by Oberholser (1974), though the circumstances under which that movement occurred were related to human-caused changes in their breeding habitat and food supply.

Although it was once considered a rare visitor to Texas from Mexico and Central America (Kortright 1942), the Black-bellied Whistling-Duck is now a well-established breeder there (Bolen 1962) and has bred as far north as Arizona (D. Clarke in Monson 1950). By 1990, it had also nested in Louisiana (S. Emmons, pers. comm.).

Additionally, Bolen (1971) notes that this species typically mates for life and returns to the same nesting site. Based on these observations, additional breeding records for this species should be expected in central Florida. Furthermore, it appears that this species is becoming better established within its existing range in Florida and could expand to other parts of the state.

I would like to thank Herb Kale, Wes Biggs, and Bill Robertson for commenting on an earlier draft of this manuscript and Fred Lohrer for his advice in researching this article. I would also like to thank Jim Sampson for his assistance in obtaining access to CF Indus-

tries' property. Color photographs of the Black-bellied Whistling-Ducks have been deposited in the archives of the Florida Ornithological Society at the Florida Museum of Natural History (File no. FOS 94).

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ST. MARKS CHRISTMAS BIRD COUNT, 1976

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In order to preserve the continuity of the annual Christmas Bird Counts at St. Augustine, Florida, R. W. Loftin (1990, Fla. Field Nat. 18: 56-57) submitted for publication that count for 1988, previously unpublished. Christmas Bird Counts at St. Marks, Wakulla Co., Florida, have been conducted annually from 1939 ("St. Marks Migratory Bird Refuge") to 1990. This 52-year record was flawed by the enigmatic failure of the 1976 count to appear in *American Birds*. Unfortunately, some details of this count are presently unavailable, but enough data are at hand to warrant publication. The format used here is similar to that used in *American Birds*.

St. Marks, FL, 28 Dec. 1976. Center of circle 1 mile WSW of St. Marks (30°08 N, 84°13 W). Before daylight to after dark. Temp. 38°-55° F. Wind WSW, 0-15 mph. Water open. Mostly cloudy (weather data from Tallahassee Weather Station). Observers in 8 parties; 102.5 party-hours.

Com. Loon 43; Pied-billed Grebe 176; Horned Grebe 98; Am. White Pelican 54; Double-crested Cormorant 537; Anhinga 22; Am. Bittern 1; Great Blue Heron 47; Great Egret 129; Snowy Egret 119; Little Blue Heron 67; Tricolored Heron 44; Green-backed Heron 5; Black-crowned Night-Heron 16; Yellow-crowned Night-Heron 3; White Ibis 294; Glossy Ibis 4; Canada Goose 126; Wood Duck 177; Green-winged Teal 51; Am. Black Duck 9;

Mallard 81; N. Pintail 347; Blue-winged Teal 6; N. Shoveler 48; Gadwall 55; Am. Wigeon 1204; Canvasback 104; Redhead 2745; Ring-necked Duck 268; Greater Scaup 371; Lesser Scaup 1250; scaup sp. 195; Oldsquaw 1; Com. Goldeneye 38; Bufflehead 258; Hooded Merganser 40; Red-breasted Merganser 81; Ruddy Duck 113; Black Vulture 68; Turkey Vulture 151; Osprey 2; Bald Eagle 11; N. Harrier 20; Sharp-shinned Hawk 3; Cooper's Hawk 1; Red-shouldered Hawk 17; Red-tailed Hawk 21; Am. Kestrel 16; Merlin 2; Wild Turkey 2; N. Bobwhite 14; Clapper Rail 32; Sora 7; Purple Gallinule 1; Com. Moorhen 43; Am. Coot 2256; Limpkin 18; Black-bellied Plover 39; Lesser Golden-Plover 1; Wilson's Plover 3; Semipalmated Plover 4; Killdeer 234; Am. Oystercatcher 2; Greater Yellowlegs 15; Lesser Yellowlegs 2; Willet 193; Spotted Sandpiper 2; Whimbrel 2; Ruddy Turnstone 73; Red Knot 1; Sanderling 8; Least Sandpiper 64; peep sp. 2; Dunlin 1036; Short-billed Dowitcher 80; Com Snipe 21; Am. Woodcock 6; Laughing Gull 29; Bonaparte's Gull 5; Ring-billed Gull 634; Herring Gull 127; Caspian Tern 1; Royal Tern 1; Forster's Tern 48; Black Skimmer 1; Mourning Dove 43; Com. Ground-Dove 4; Groove-billed Ani 1 (J. Stevenson party); E. Screech-Owl 17; Great Horned Owl 6; Barred Owl 19; Whip-poor-will 1; Belted Kingfisher 38; Red-headed Woodpecker 1; Red-bellied Woodpecker 108; Yellow-bellied Sapsucker 30; Downy Woodpecker 16; Hairy Woodpecker 10; Red-cockaded Woodpecker 4; N. Flicker 81; Pileated Woodpecker 45; E. Phoebe 52; Tree Swallow 2060; Blue Jay 144; Am. Crow 82; Fish Crow 227; Carolina Chickadee 99; Tufted Titmouse 36; Red-breasted Nuthatch 2; Brown-headed Nuthatch 31; Carolina Wren 100; House Wren 32; Winter Wren 3; Sedge Wren 13; Marsh Wren 21; Golden-crowned Kinglet 11; Ruby-crowned Kinglet 299; Blue-gray Gnatcatcher 6; E. Bluebird 55; Hermit Thrush 52; Am. Robin 3260; Gray Catbird 39; N. Mockingbird 123; Brown Thrasher 49; Water Pipit 9; Cedar Waxwing 256; Loggerhead Shrike 28; Eur. Starling 29; White-eyed Vireo 6; Solitary Vireo 17; Orange-crowned Warbler 15; Yellow-rumped Warbler 1987; Yellow-throated Warbler 4; Pine Warbler 48; Palm Warbler 2; Black-and-white Warbler 5; Com. Yellowthroat 58; N. Cardinal 238; Rufous-sided Towhee 146; Field Sparrow 22; Vesper Sparrow 8; Savannah Sparrow 22; Grasshopper Sparrow 2; Henslow's Sparrow 1; Le Conte's Sparrow 2; Sharp-tailed Sparrow 11; Seaside Sparrow 13; Fox Sparrow 6; Song Sparrow 64; Lincoln's Sparrow 1 (J. Stevenson party); White-throated Sparrow 318; White-crowned Sparrow 3; Dark-eyed Junco 4; Red-winged Blackbird 951; E. Meadowlark 37; Rusty Blackbird 11; Boat-tailed Grackle 380; Com. Grackle 5630; Brown-headed Cowbird 60; Purple Finch 42; Am. Goldfinch 205; House Sparrow 4.

Total: 162 species; 32,064 individuals.

Party leaders: Wilson Baker, Henry and Joy Buba, Robert Crawford, Culver Gidden, Henry Stevenson, Jim Stevenson, Mrs. Frank Stoutamire, Noel Wamer (compiler).

Fla. Field Nat. 19(3): 83-84, 1991.

AGONISTIC BEHAVIOR OF RUDDY TURNSTONES TOWARD SHORT-BILLED DOWITCHERS FORAGING FOR HORSESHOE CRAB EGGS

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Ruddy Turnstones (*Arenaria interpres*) may be highly aggressive toward other species of shorebirds, including the Short-billed Dowitcher (*Limnodromus griseus*) (Burger et al. 1979), but agonistic behavior of turnstones toward dowitchers at specific foraging sites is not well documented. Turnstones are opportunistic foragers and may use many feeding methods (Beven and England 1977, Groves 1978, Cramp and Simmons 1983, Collins and Thomas 1984, Donoghue et al. 1986). In this note, I document a foraging behavior of the Ruddy Turnstone whereby one turnstone repeatedly supplanted Short-billed Dowitchers foraging for horseshoe crab (*Limulus polyphemus*) eggs.

I observed Ruddy Turnstones and Short-billed Dowitchers foraging among a mixed-species flock of shorebirds on wet sand flats on the Gulf of Mexico at Lanark Island, Franklin County, Florida, on 26 April 1990. Two turnstones foraged among approximately 30 dowitchers, one Black-bellied Plover (*Pluvialis squatarola*), several Willets (*Catoptrophorus semipalmatus*), and several species of smaller shorebirds. One turnstone repeatedly evicted the other foraging turnstone and supplanted foraging dowitchers, but was not aggressive toward the remaining shorebirds. Dowitchers, unlike turnstones, probed the full length of their bills into the sand. The more aggressive of the turnstones repeatedly peered into dowitcher probe-holes. At least 40 times this turnstone supplanted a dowitcher immediately after the dowitcher bored a hole. I did not see this turnstone take food directly from the dowitchers. Few dowitchers attempted to reclaim their probe-holes and none that attempted this was successful. The turnstone usually peered into the hole and then left promptly. However, at least 10 times, the turnstone dug into the holes to depths of 4 cm and twice the turnstone fed on small clumps of horseshoe crab eggs at two excavated probe-holes. When not supplanting dowitchers from their probe-holes, the turnstone excavated in undisturbed sand to depths of 2.5 cm. After observing the birds 1 h, I flushed all shorebirds from the sand flat and scooped out 50 spoonfulls of sand to the depth of 6 cm; three samples contained small clumps of *Limulus* eggs, none located deeper than 4 cm below the surface. No other large prey items were evident in these samples.

Both Ruddy Turnstones and Short-billed Dowitchers are known to engage in intraspecific defense of *Limulus* eggs, which are a highly seasonal and valued food source (Mallory and Schneider 1979, Myers and McCaffery 1984, Myers 1986, Sullivan 1986). Turnstones may dig unaided in wet sand for *Limulus* eggs to depths to 10 cm (Myers 1986), yet at Lanark Island, turnstones only dug unaided to a depth of 2.5 cm. When aided by dowitcher probe-holes, turnstones dug to a depth of 4 cm at Lanark Island. Probe-holes of dowitchers undoubtedly facilitated discovery of *Limulus* eggs by turnstones, which rely heavily on vision when foraging (Cramp and Simmons 1983). One turnstone at Lanark Island was able to procure *Limulus* eggs more easily by supplanting dowitchers at their probe-holes. Thus, this turnstone was able to procure a highly seasonal and valued food by using a foraging method not typical of this species.

I thank P. G. Merritt, W. Post, and an anonymous individual for reviewing this note.

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COPULATION IN THE MANGROVE CUCKOO (*COCCYZUS MINOR*)

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Although courtship feeding has been described in the Mangrove Cuckoo (*Coccyzus minor*) (Langridge 1990), the copulatory behavior of this species has not been documented. This note describes the vocal and feeding behavior of the female prior to copulation, and the pre-copulatory display and copulation.

I located a pair of Mangrove Cuckoos in Rockland Hammock at John Pennecamp State Park, Key Largo, Monroe County, Florida, on the early morning of 24 May 1990. The fairly open tropical hammock understory allowed uninterrupted observation of the bird's activities. The female cuckoo, whose sex identification was based on observation of later copulatory position, called near the top of a 10 m Wild Tamarind (*Lysiloma bahamense*) at 0645 h. The location of the male at this time was unknown. Without moving, the female continued to call in short bouts of 5-10 querulous guttural notes, at intervals of about 45 s, for 5 min. At 0649 h, she suddenly flew for 15 m, landed, then walked and hopped on the forest floor. The cuckoo appeared to be foraging, but she did not catch anything. She soon returned to the forest canopy where she resumed calling as before.

At 0650 h, the female again returned to the ground and resumed foraging on and very near the forest floor. At 0653 h, she captured a 10 cm long orthopteran. She discarded the wings, then tore off the legs and ate them. Finally, she beat the body of the insect against the ground and pulverized it. She finished eating it at 0657 h. Throughout this feeding bout, the female occasionally emitted subdued guttural calls, 1-2 at a time.

From 0658-0659 h, the female cuckoo rested motionless on the ground. Her breast appeared to be substantially enlarged from the meal, presumably caused by a full crop.

At 0700 h, the female left the forest floor and flew to a horizontal branch 5 m above ground. She perched lengthwise along the branch and elevated her bill, upper body, and tail. She then began vigorous, rhythmic tail-pumping (about 20/min), raising and depressing the tail 180 degrees while uttering very quiet monosyllabic calls for 2 min. At 0702 h 15 s, the male Mangrove Cuckoo flew in without calling and perched at the edge of the forest canopy, where he remained in a flight intention posture 10 m away from the female. Five seconds later he flew directly to the female, mounted her somewhat laterally (from the left side), and grasped her bill. Copulation lasted for 6 sec. I heard no calls. When the pair parted, the male flew 15 m, landing in the forest canopy. The female remained motionless on the branch for 10 sec and then flew 10 m to the mid-to-upper canopy.

At 0705 h, both birds still remained in the canopy, 20 m apart. The female occasionally uttered her querulous guttural call.

Female pre-copulatory display and copulation in the Mangrove Cuckoo are evidently similar to these behaviors in the Yellow-billed (*C. americanus*) and Black-billed (*C. erythropthalmus*) cuckoos (Eaton 1979, Potter 1980, Pistorius 1985). Males of these three species may feed females during courtship feeding or copulation (Potter 1980 and references cited therein, Pistorius 1985, Langridge 1990 and references cited therein). However, all accounts of courtship feeding in these three species of cuckoos are brief anecdotes which document considerable variation in behavior, and the complexity and function of courtship feeding remain to be elucidated. For the Mangrove Cuckoo, courtship feeding has been previously described in an apparently precopulatory context (Langridge 1990), but it did not accompany copulation in the present observation. This may have been because the female Mangrove Cuckoo I watched had fed just prior to copulation. Thus, while courtship feeding may occur prior to copulation, it is not necessarily a prerequisite for copulation to occur.

I thank H. Langridge, R. T. Paul, W. Post, and E. F. Potter for critical comments.

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REVIEW

Fla. Field Nat. 19(3): 86-87, 1991.

The Audubon Ark: A History of the National Audubon Society.—Frank Graham, Jr. 1990. New York, Alfred A. Knopf, Inc. ISBN 0-394-58164-4. $29.95.—The title of this 334-page book captures the mission of the National Audubon Society, the protection of wild birds and other animals in their natural habitats. This authorized history of the National Audubon Society traces its evolution from the 1880's to the late 1980's. Originally started as a series of pamphlets published by George Bird Grinnell to protest plume hunting for the millinery trade, the National Audubon Society today has a professional staff of 350 and over a half million members in more than 500 local chapters. Through lobbying, education, and publicity efforts, the society has swayed public opinion in such diverse areas as migratory bird laws, widespread spraying of pesticides, the whaling industry, fishing flies, and the alligator leather trade. The author paints a colorful account of the environmental movement in the United States by tracing the dealings of this often controversial organization. The inclusion of 48 black-and-white photographs, many of them quite old, adds realism and value to this highly collectible book.

The Audubon Ark is particularly interesting because of its many references to Florida. The book describes the selling of flamingos for five dollars a pair in Key West in the 1850's. Opposition to plume hunting in the Everglades resulted in the institution of Audubon's warden system and gave momentum to the society. The establishment of Audubon's research station at Tavernier in the late 1930's for studying the only nesting colony of Roseate Spoonbills in Florida is described in vivid detail, as are the subsequent research activities around Florida Bay. The account of building the mile-long boardwalk through Corkscrew Swamp in the 1950's will give new appreciation to anyone visiting this sanctuary, acquired by the society for the protection of the Wood Stork. The resident cranes, ibises, egrets, and caracaras of the Kissimmee Prairie led the society to purchase over 7,000 acres there. Other historic references to Florida include Pelican Island, National Key Deer Wildlife Refuge, Great White Heron Refuge, Lake Okeechobee, Tampa Bay, and Ten Thousand Islands.

Dedicated to wildlife management and natural resource conservation, the society maintains a quarter million acres in sanctuaries nationwide. This book presents the ups and downs of land acquisition and the specifics about many of the society's 80 sanctuaries. Endeavors in the field of education, including publications, nature camps, film making, and television programs, are also documented.

Audubon, the popular magazine published by the society, has an interesting history all its own. Graham describes its early beginnings as *Audubon Magazine*, a spin-off of Grinnell's *Forest and Stream* in the 1880's. It was known as *Bird Lore* from 1899 to 1940, and eventually evolved into the award-winning publication *Audubon*, called "the most beautiful magazine in the world" by *The New York Times*. These publications along with personal interviews formed the basis of the painstaking research that went into producing a book of this caliber. The author gives credit to Carl W. Buchheister, a former president of the National Audubon Society, for the early planning of the book, his research efforts, and his collection of documents turned over to the author in 1986.

The assortment of facts contained in this book, many of them obscure, will fascinate the reader. For example, at the suggestion of the society in the mid-1950's, a 25-million-candlepower fixed-beam light on top of the Empire State Building was extinguished during migration to save thousands of migratory birds each year. Tales of the days with bounties on bald eagles, considered a pest species, are enough to ruffle the feathers of any "Auduboner" today. The society itself had less than scrupulous dealings which will surprise the reader—such as its half million dollars per year in oil revenues from a Louisiana sanctuary.

As *The Audubon Ark* portrays, the Audubon Society involves more than birds. Its history owes its greatness to the people who worked for its causes and spread the message that humans are closely linked to the natural world. Graham's book captures the society's treatment of nature as delicate, interdependent ecosystems and stimulates environmental empathy.—**Victoria L. Merritt,** 8558 S.E. Sharon Street, Hobe Sound, FL 33455.

REPORTS

Fla. Field Nat. 19(3): 87, 1991.

Summary of the 1991 Spring Meeting.—The spring meeting of the Florida Ornithological Society was held at the Bahia Beach Island Resort in Ruskin, Florida, from 19 to 21 April. Tampa Audubon Society was the host chapter, and Gail Parsons was the local committee chair.

During the board meeting, the Board voted to award the Helen G. and Allan D. Cruickshank Research Award of $500 to Mr. Reuven Yosef of Ohio State University for work on the "Evaluation of a technique for reversing the population decline of the Loggerhead Shrike." The Board gave $800 to the Florida Breeding Bird Atlas project for the final year of field work. Dr. J. W. Hardy has resigned as Editor of Special Publications, and Dr. Glen Woolfenden was appointed to the position. During the annual membership meeting on Saturday, new officers and directors were elected. Glen Woolfenden was elected President, P. William Smith Vice President, Roberta Geanangel Treasurer, and Bruce Neville Secretary. New Directors are Reed Bowman, Todd Engstrom, and Bill Pranty, with Dr. William Robertson elected to fill the remaining year of P. William Smith's term.

The Saturday afternoon paper session on "Breeding Biology and Management of Florida Kestrels" was moderated by Reed Bowman. Dr. Robert Loftin spoke on "A Florida Kestrel nest box program." Dr. John Smallwood spoke on a "Nest box program for management of the southeastern American Kestrel," co-authored by Dr. Michael Collopy. Dr. James Layne spoke on "Nest sites and habitat associations of resident Kestrels in south-central Florida." Dr. Michael Collopy spoke on "Habitat protection guidelines for the southeastern American Kestrel."

Field trips were held to Little Manatee River, Alafia Banks, McKay Bay, Cockroach Bay, and Fort DeSoto Park. The "skin" quiz was a contest to add the most species to the Ruskin quad for the Breeding Bird Atlas project and was won by the team of Joe Ondrejko, Sue Smith, and Mickey Wheeler. The banquet speaker was Rich Paul, Manager of National Audubon's Tampa Bay Sanctuaries, who spoke on "Population, Wildlife, and Habitat: A Comparison of Bird Sanctuaries in Florida and Thailand."

The 1991 fall meeting will be 4-6 October in Jacksonville. The 1992 spring meeting will be a joint meeting with the Wilson Ornithological Society in Kissimmee 9-12 April.—**Bruce Neville,** 3757 Maria Circle, Tallahassee, FL 32303.

Fla. Field Nat. 19(3): 88-89, 1991.

FOS Records Committee Report.—This is the seventh report of the Florida Ornithological Society Records Committee, covering 1989. Table 1 contains 21 records of which 11 were accepted and 10 were not accepted. One record (89-170) was withdrawn. Committee members are Jocelyn Lee Baker (secretary), Wally George, Larry Hopkins, William Robertson and Henry Stevenson.

Sightings of rare birds in Florida should be submitted to the secretary of the Records Committee. All records published thus far have been placed in a permanent file in the FOS Archives at the Florida Museum of Natural History in Gainesville where they are available for research. Documentation for accepted birds listed in this report was submitted by: Jocelyn L. Baker, Paul Bithorn, William J. Boyle, Jr., Howard P. Langridge, Bruce D. Neville, Barbara Stedman, Paul Sykes, Pate Ware and Mickey Wheeler.—**Jocelyn Lee Baker,** Secretary, 851 North Surf Road, Apartment #302, Hollywood, Florida 33019.

Table 1. FOS Records Committee Report—1989.

Number	Date received	Species	Date observed	Location (County)	Decision
89-166	27 January 89	Western Grebe	2 December 86	Lake Worth (Palm Beach)	Not accepted
89-177	24 October 89	Black-capped Petrel	28 April 89	(Monroe)	Not accepted
89-165	27 January 89	Rough-legged Hawk	5 January 89	(Hendry)	Not accepted
89-167	2 February 89	Purple Sandpiper[1]	14-31 December 88	Naples (Collier)	Accepted
89-182	31 October 89	California Gull	26 February 89	Pompano Beach (Broward)	Not accepted
89-168	2 February 89	Dovekie	28 November 88	Ft. Lauderdale (Broward)	Accepted
89-171	18 February 89	Dovekie	25 November 88	Lake Worth (Palm Beach)	Accepted
89-164	27 January 89	Lesser Nighthawk[1]	24 April 84	Dry Tortugas (Monroe)	Accepted
89-169	2 February 89	Black-chinned Hummingbird	21-24 December 88	Panama City (Bay)	Accepted
89-173	7 March 89	Willow Flycatcher	14-15 February 89	Everglades NP (Monroe)	Not accepted
89-175	26 March 89	Cassin's Kingbird[1]	17 December 88	Loxahatchee NWR (Palm Beach)	Accepted
89-162	13 January 89	Violet-green Swallow[1]	20 February 88	Everglades NP (Monroe)	Not accepted
89-180	24 October 89	Bahama Mockingbird[1]	8 April 89	Bill Baggs SP (Dade)	Accepted
89-178	24 October 89	Curve-billed Thrasher[1]	20 May 89	St. George SP (Franklin)	Accepted
89-179	24 October 89	Thick-billed Vireo[2]	15 September 89	Bill Baggs SP (Dade)	Accepted
89-172	7 March 89	Black-throated Gray Warbler	12 February 89	Everglades NP (Dade)	Not accepted
89-176	24 October 89	Kirtland's Warbler	11 May 89	Merritt Island NWR (Brevard)	Not accepted
89-174	26 March 89	Bananaquit	9-22 February 89	John Lloyd SRA (Broward)	Accepted
89-161	13 January 89	Black-faced Grassquit	18 December 88	(St. Lucie)	Not accepted
89-181	24 October 89	Chestnut-collared Longspur[1]	26 November 83	Everglades NP (Monroe)	Not accepted
89-163	19 January 89	Shiny Cowbird[1]	25-26 April 88	Dry Tortugas (Monroe)	Accepted

[1]Documentation includes photograph(s).
[2]Documentation includes sonogram.

FIELD OBSERVATIONS

Fla. Field Nat. 19(3): 90-95, 1991.

WINTER REPORT: MARCH-MAY 1991

FOS Field Observation Committee

Compiler: *Jim Cox, Florida Game and Fresh Water Fish Commission*
620 S. Meridian St., Tallahassee, Florida 32399-1600

The observations listed here are based on unsubstantiated accounts of rare birds and unusual numbers of birds reported to the FOS Field Observation Committee (Linda Cooper, Jim Cox, Peggy Powell, Bill Pranty, and Wayne Hoffman). The observations are not subjected to a thorough evaluation and formal peer review and thus must be considered tentative pending further review. We encourage observers to report their sightings to the FOS Records Committee (c/o Jocelyn L. Baker, Secretary, 851 N. Surf Rd., #302, Hollywood, FL 33019) for formal consideration. We also encourage observers to prepare formal notes and articles to describe extremely rare and unusual sightings.

Several conventions have been adopted in this report to save space. A 3-character set of alpha-numeric initials is used to identify contributors within the accounts of individual species. A complete list of observers and corresponding initials is provided at the end of this report. The list of observers is organized alpha-numerically using the 3-character initials. Names of observers for this report are drawn from a master list containing >150 names, and this procedure may result in occasional gaps in the alpha-numeric sequence (e.g., the listing of BB2 without a previous BB1). Another convention adopted is the use of common names exclusively. Persons interested in scientific names should consult AOU (1983. Checklist of the North American Birds, 6th ed., Washington, D.C., Am. Ornithol. Union) and revisions published in *The Auk*. Other abbreviations used occasionally are: imm., immature; m. obs., many observers; NP, national park; NS, national seashore; NWR, national wildlife refuge; SP, state park; SRA, state recreation area; and S, W, N, E etc. for compass headings. Unless necessary to clarify the location, the counties of named locations are omitted.

The FOS Field Observations Committee would like to thank everyone who contributed information. Please bring any unusual observations not reported here to the attention of Jim Cox, compiler.

Summary of the Winter Season

The winter of 1990-1991 was characterized by generally mild temperatures throughout the state and very heavy rainfall late in the season in northern counties. The mild temperatures likely contributed to the diversity of late reports of summer breeders and fall migrants throughout the state. In contrast, several southerly records noted in the Fall report for wintering songbirds continued on into winter (e.g., Brewer's Blackbird, Cedar Waxwing, Golden-crowned Kinglet). Increased wintering sparrow abundances were reported in central Florida where habitat has increased as a result of freeze-killed orange groves now containing greater amounts of grass and shrub.

There were several notable concentrations and unusual sightings of coastal and pelagic species. Among the more interesting of these were two reports of Black-legged Kittiwake, high numbers of Northern Gannets, Pomarine and Parasitic Jaegers, and Double-crested Cormorants at various locations, as well as interior records for coastal gulls and Brown

Pelican. Although more than 100 cm of rain fell across north Florida in January and February creating extensive flooding, there were no noticeable effects on birds reported as a result of these downpours. Finally, wintering duck populations were generally reported as low again this winter.

Species Accounts

Red-Throated Loon: 2 at St. Marks NWR on 16 Dec (DS1); imm. in Port Richey (Pasco Co.) on 27 Dec (BP1, DG1, PY1, m. obs.), first co. record since 1888; 1 at Merritt Island NWR from 10 to 16 Dec (m. obs.).

Common Loon: 300 off Honeymoon Island SRA (Pinellas Co.) on 6 Feb. (SB1, MT1); high number.

Eared Grebe: 1 off Crystal Beach (Pinellas Co.) on 17 Jan (SB1, MT1), irregular in area; 4 throughout period at 2 Polk Co. locations (m. obs.).

Brown Booby: adult off St. George Island (Franklin Co.) on 17 Feb (RW3), flying with imm. Northern Gannets.

Northern Gannet: hundreds off St. George Island (Franklin Co.) throughout winter (RW3).

Double-crested Cormorant: enormous flock of 25,000+ off Anclote Key (Pasco Co.) on 15 Jan (BP1, PY1).

Brown Pelican: 2 inland records: 1 at Lake Istokpoga (Highlands Co.) on Lake Placid CBC on 23 Dec (GW1, JF2), first count record; injured bird near Lake Jackson (Leon Co.) on 3 Feb (BN2, DE2).

Magnificent Frigatebird: 1 at Canaveral NS (Brevard Co.) on 3 Dec (HR1), rare this late.

Great Blue Heron, white morph: adult in Brandon (Hillsborough Co.) from Aug through 4 Dec (RP1); 1 on nest on Cortez Key (Sarasota Co.) on 8 Jan and 25 Feb (RP1) where a bird has regularly nested since 1982.

Reddish Egret, white morph: 2 reports N of normal range of white morphs: imm. on Three Rooker Bar (Pinellas Co.) on 15 Jan (BP1, PY1, DR2); imm. on Anclote Key (Pasco Co.) on 15 Jan, first co. record of white morph.

White Ibis: 1,341 on Lakeland CBC on 15 Dec, twice the usual number; RP1 estimates a 90% reduction in the number of breeding pairs at Alafia Banks rookery (Hillsborough Co.): 40,000+ pairs in 1940's, 22,000 in the late 50's, 15,000 in the mid 70's, 6000-10,000 in the mid 80's, and only 4000-5000 pairs presently.

Glossy Ibis: 477 on Lakeland CBC on 15 Dec, twice the usual number.

Greater White-fronted Goose: 1 at St. Marks NWR on 1 Jan (DS1); 22 near Lanark Village (Franklin Co.) on 21 Jan (DB3), large number.

American Black Duck: only 1 winter report for NW region (RD1).

Eurasian Widgeon: male at Merritt Island NWR from 13 Dec through 31 Jan (HR1).

Ring-necked Duck: erythristic female at Lake Marion (Polk Co.) on 26 Jan (TP1).

Lesser Scaup: decreasing numbers reported for Tampa Bay (RP1) over last 20 years: 60,000-106,000 from 1971-75 and 1977; 8000-20,000 during 1976 and 1978-81; 5000 from 1981-1990. Largest concentration in 1991 was ca. 700 birds.

Greater Scaup: 60 off Turtle Mound (Volusia Co.) on 1 Dec (HR1); 22 at Merritt Island NWR (Brevard Co.) on 12 Jan (m. obs.).

Common Goldeneye: female on East Pasco CBC on 26 Dec (LH1, RS2); 1 in Tarpon Springs (Pinellas Co.) on N Pinellas CBC on 22 Dec (*fide* PT3), rare and irregular in Tampa area.

Surf Scoter: 1 on Cedar Key CBC (Levy Co.) on 29 Dec (BC2, LC2, DH2, BW1), first count record; 3 in Cedar Key area on 17 Jan (BM3, DH2, BW1).

Common Merganser: pair at Kennedy Space Center (Brevard Co.) from 10-15 Dec (*fide* DS3).

RED-BREASTED MERGANSER: 1 male at IMC mines (Polk Co.) on 16 Feb (m. obs.); male in downtown Lakeland on 21 Feb (TP1), unusual location.

TURKEY VULTURE: 128 moving SE past Lake Jackson (Leon Co.) on 1 Jan (JC1), notable concentration for area.

SWALLOW-TAILED KITE: 1 in Lakeland on 30 Jan (JG4), first winter record for area.

SNAIL KITE: 1 at Lake Istokpoga (Highlands Co.) on 23 Dec (MB2), first winter record for area.

COOPER'S HAWK: courtship behavior observed early at Melbourne Village (Brevard Co.) on 22 Feb (BH2, SH1), nested in area last year.

BROAD-WINGED HAWK: early record in Tallahassee on 22 Feb (JC3, KN1); heard and then seen soaring.

SHORT-TAILED HAWK: light morph at St. Marks NWR on Jan 20 (DE3), near place where 1 was seen last year; dark morph SW of Sebring (Highlands Co.) on 20 Feb (FL1, JF2).

SWAINSON'S HAWK: 1 on Lake Placid CBC (Highlands Co.) on 23 Dec (BP1, DG1, GW1, GS2); good details provided.

PEREGRINE FALCON: many reports of 1 in downtown Jacksonville where pair wintered last year.

CRESTED CARACARA: 1 on Lake Wales CBC (Polk Co.) on 29 Dec, first count record.

BLACK RAIL: 1 seen at St. Marks NWR on 9 Dec (BN2); 1 heard in Upper Tampa Bay Park (Hillsborough Co.) on N Pinellas CBC on 22 Dec (BP1); 1 heard on offshore key near Cedar Key on 29 Dec (BC2, LC2, DH2, BW2); status unknown in winter.

SANDHILL CRANE: 6 at St. Marks NWR on 9 Dec (DE2, BN2), unusual number.

BLACK-NECKED STILT: 35 at McKay Bay (Hillsborough Co.) on 26 Jan (RS2), high number for winter.

PIPING PLOVER: 233 recorded in Pasco and Pinellas Cos. as part of the annual winter survey conducted on 15, 19 Jan (m. obs., *fide* SB1, JR6); concentrations/unusual sightings were 5 on Anclote Key (Pasco Co.), 59 on Three Rooker Bar (Pinellas Co.), 102 on Honeymoon Island SRA, 12 on Caladesi Island SRA, 19 on N Clearwater Beach, 10 on Sand Key, 19 in Fort DeSoto Park, and 2 on the Sunshine Skyway causeway. Concentrations/unusual sightings elsewhere were: 41 at Lanark Reef (Franklin Co.) on 21 Jan (DB3, RC2); 1 off Shell Mound (Levy Co.) on 2 Feb (JH3, RB2).

SNOWY PLOVER: 12 at Fort DeSoto Park (Pinellas Co.) on 31 Dec (SB1, MT1), large number for area; 22 at St. George Island SP (Franklin Co.) on 20 Feb (DB3).

AMERICAN OYSTERCATCHER: 850 near Cedar Key (Levy Co.) on 29 Dec (BC2, LC2, DH2, BW1), very large number.

SOLITARY SANDPIPER: 2 on Lake Placid CBC (Highlands Co.) on 23 Dec (BP1, DG1, GW1, GS2).

AMERICAN AVOCET: 1 at Buck Island (Duval Co.) on 26 Feb (RL1), unusual.

LONG-BILLED CURLEW: 1 wintered at Cape San Blas (Gulf Co.) from 27 Dec (SS1) to at least 21 Jan (DS1).

LONG-BILLED DOWITCHER: 1 at St. Marks NWR on 8 Feb (DE2), few mid-winter reports.

AMERICAN WOODCOCK: early breeding record (based on lengthy distraction behavior) from SW Jackson Co. on 17 Jan (*fide* RW1).

CARIBBEAN COOT: 2 on St. Petersburg CBC (Pinellas Co.) on 15 Dec (BP1, DG1, WB1, m obs.); 1 on Tampa CBC (Hillsborough Co.) on 29 Dec (BP1, DG1, GS2); 1 on Lake Pasadena (Pasco Co.) on 19 Jan (BP1, DG1, DR2).

LITTLE GULL: first basic plumage bird at Lake Jessup (Seminole Co.) from 31 Dec through mid Jan (TR1, CT2, m. obs.).

BONAPARTE'S GULL: 300 at Tierra Verde (Pinellas Co.) during a storm on 15 Feb (LA1, BA1), locally high number.

LESSER BLACK-BACKED GULL: 2 (1 first-year, 1 third-year) at Pinellas Co. landfill on 1 Dec (LA1, BA1); rare inland record of adult at Keystone Heights dump (Bradford Co.)

on 7, 15, and 20 Dec (BB4); first-year bird at Eastpoint landfill (Franklin Co.) on 29 Dec (LA1, BA1); 1 adult, 1 imm. at Wards Bank (Duval Co.) on 6 Feb (BR2).

GREAT BLACK-BACKED GULL: imm. at Keystone Heights Dump (Bradford Co.) on 28 Dec (BB4, JM2), accidental; 4 at Fort DeSoto Park/Sunshine Skyway Causeway (Pinellas Co.) from 8 Jan to 28 Feb (LA1, SD1), good number for the Gulf coast.

BLACK-LEGGED KITTIWAKE: 2 at St. George Island (Franklin Co.) on 27 Dec (RW3), photo taken of one that lay exhausted on the beach and later died (TM1); 2 in first basic plumage at Sebastian Inlet (Brevard Co.) on 6 Jan (HR1).

GLAUCOUS GULL: first basic plumage bird at Wards Bank (Duval Co.) on 6 Feb. (BR2).

PARASITIC JAEGER: 15 at Turtle Mound (Volusia Co.) on 1, 2, Dec (HR1).

POMARINE JAEGER: 1,717 migrating S past Turtle Mound (Volusia Co.) on 1-3 Dec (HR1).

ROYAL TERN: 26 at IMC mines (Polk Co.) on 31 Dec (PF1, CG1, BD1, HD1), high co. record.

EURASIAN COLLARED DOVE: 2 in Ozello (Citrus Co.), throughout period (BS3).

RINGED TURTLE-DOVE: 1 singing N of Hudson (Pasco Co.) on 2 Feb (BP1, DR2); irregular outside St. Petersburg, but reported annually in Pasco Co. since 1985.

BLUE-CROWNED PARAKEET: 2 in Dunedin (Pinellas Co.) on 6 Feb (SB1, MT1); second consecutive winter sighting here.

BLACK-HOODED PARAKEET: 2 N of Dade City (Pasco Co.) since mid-Dec (BP1, DR2), new area for this exotic.

COCKATIEL: 1 in Crews Lake Park (Pasco Co.) on 20 Jan (DR2); first co. record (local escapee).

GROOVE-BILLED ANI: 1 at Paynes Prairie SP (Alachua Co.) on 9 Jan (BS2, ES2) and later on 24 Jan (DH2, BM3).

SHORT-EARED OWL: 1 on Lake Placid CBC (Highlands Co.) on 29 Dec (JF2), first count record; 1 at Merritt Island NWR (Brevard Co.) from 13 Dec through 31 Jan (HR1), possibly same one as last year.

CHUCK-WILL'S-WIDOW: 1 on Lake Placid CBC (Highlands Co.) on 29 Dec (BP1, DG1, GW1, GS2); first record.

COMMON NIGHTHAWK: 2 (calling) in Pinellas Co. on 18 Dec (RS2), rare in winter.

RUBY-THROATED HUMMINGBIRD: several reports from feeders in Titusville (Brevard Co.) during period (DS3).

BLACK-CHINNED HUMMINGBIRD: first-year male (violet gorget developing) at Cedar Key (Levy Co.) on 4-8 Jan (DH2, DF3).

Selasphorus sp.: 1 arrived in Gainesville on 15 Nov and stayed through 7 Mar (DF3, m. obs.). Bird had rufous color on head, back, and tail, but gorget did not develop. One seen at different feeders at Cedar Key (Levy Co.) from 19 to 27 Jan (DF3, DH2).

Chaetura sp.: 2 swifts, perhaps early Chimney Swifts, over NW Pasco Co. on 28 Feb (PY1).

VERMILION FLYCATCHER: 1 stayed at St. Marks NWR from mid Dec-mid Feb (m. obs.), last seen just before major storm dumped 40+ cm of rain; female at White Oaks Plantation (Duval Co.) throughout season (MT1); 1 at Lake Woodruff NWR (Volusia Co.) on 26 Jan (HR1).

WESTERN KINGBIRD: 1 at St. George Island Causeway (Franklin Co.) on 2 Dec (BN2, DE2); 1 at Alligator Point (Franklin Co.) on 9 Dec (DE2, BN2); 2 in Polk Co. on 9 Dec (TP1); 1 SE of San Antonio (Pasco Co.) on E Pasco CBC on 26 Dec (PF1, CG1, PT2); 22 in Homestead Area (Dade Co.) on 6 Jan (DF1); 1 at White Oaks Plantation (Duval Co.) from 10 Jan to end of season (MT1).

GREAT CRESTED FLYCATCHER: 2 reports from rural Alachua Co.: 1 from 28 Nov through end of period (JH2) and 1 from 2 to 17 Jan (m. obs.); 1 called 5 times on University of Florida campus (Alachua Co.) on 1 Feb but not seen (BM5).

Empidonax sp.: 1 at Paynes Prairie SP (Alachua Co.) on 6 Dec. (RR1); 1 at same place on 18 Feb. (JH2, AK1) was most akin to a Traill's; 1 in Tallahassee on 25 Jan (BN2); whatever the species, these are rare winter records.

TREE-SWALLOW: roost of 500,000± at Lake Istokpoga on Lake Placid CBC (ML1, CW3, MW2); 1,000,000+ at Merritt Island NWR on 24 Jan (HR1); these large numbers may be attributed to drought conditions farther south.

CAROLINA CHICKADEE: 7 in Brevard Co. on 15 Feb (DS3), unusual location.

RED-BREASTED NUTHATCH: 1 at University of North Florida campus (Duval Co.) on 10 Jan (RL1), only report received.

BROWN CREEPER: 2 reports from Tallahassee area on 6 Dec (TM2) and 2 Jan (DE2); 1 at St. Marks NWR on 2 Dec (DE2), unusual near coast; 1 in Gainesville on 27 Feb (SM1).

BEWICK'S WREN: 1 in Apalachicola NF (Leon Co.) on 26 Nov and 6 Jan (TM2), rare in recent years.

WINTER WREN: 1 in Apalachicola NF (Leon Co.) on 6 Dec (TM2), unusual location.

GOLDEN-CROWNED KINGLET: 2 in NW Pasco on 14 Dec (PY1), first co. record; 1 on St. Petersburg CBC (Pinellas Co.) on 15 Dec (DR2); 1 on S Brevard CBC on 29 Dec (m. obs.), first count record.

CEDAR WAXWING: 4 flocks totaling 750 birds in Beacon Woods (Pasco Co.) on 27 Feb (BP1); very large number for area and indicative of abundance reported in area throughout winter.

AMERICAN PIPIT: 1 at St. Marks NWR on 2 Dec (BN2), rare in recent years; only 40 in Avon Park area (Highlands Co.) on 8 Feb (DF1), lower numbers for this area.

TENNESSEE WARBLER: 1 on Lake Placid CBC (Highlands Co.) on 29 Dec (DG1, BP1), first count record; 1 on Ponce Inlet CBC (Volusia Co.) on 27 Dec.

YELLOW WARBLER: 1 in Carillon (Pinellas Co.) on St. Petersburg CBC on 15 Dec (MH4); 1 on the Ponce Inlet CBC (Volusia Co.) on 27 Dec; very rare in winter.

CAPE MAY WARBLER: 1 on Ponce Inlet CBC (Volusia Co.) on 27 Dec, first count record; 1 at M-K Ranch (Gulf Co.) on 27 Dec (JL2).

BLACK-THROATED GREEN WARBLER: up to 3 in Sawgrass Lake Park (Pinellas Co.) from 17 Dec (HB1) through end of period (*fide* DG1); 1 NW of Lake Pasadena (Pasco Co.) on 26 Dec on E Pasco CBC (DR2); perhaps becoming more regular in winter in the Tampa Bay area.

BAY-BREASTED WARBLER: 1 in Orange Co. on 3 Jan (HR1).

AMERICAN REDSTART: 1 on Lake Placid CBC (Highlands Co.) on 29 Dec, 2nd count record.

BLACKBURNIAN WARBLER: 1 on the Ponce Inlet CBC on 27 Dec, first count record.

WORM-EATING WARBLER: 1 on South Brevard CBC, 2nd count record.

LOUISIANA WATERTHRUSH: 1 in the Starkey Wellfield (Pasco Co.) on the W Pasco CBC on 27 Dec (BP1, DR1), extremely rare in winter.

NORTHERN WATERTHRUSH: 1 on the Brooksville CBC (Hernando Co.) on 17 Dec (LA1, DG2).

HOODED WARBLER: male at Melbourne Village (Brevard Co.) throughout period (BH2, SH1).

CANADA WARBLER: 1 at bird bath at Melbourne Village (Brevard Co.) on 12 Dec (BH2, SH1).

OVENBIRD: 1 S of Tallahassee on 30 Dec (TM2); not regularly reported in winter.

STRIPED-HEADED TANAGER: good description of female at Snake Bight Trail, Everglades NP, on 14 Dec (MG2, BP2); bird observed for over an hour and photographed.

SUMMER TANAGER: 1 in Venus (Highlands Co.) on 13 Feb (PS1, SS1).

SCARLET TANAGER: male near coast in Citrus Co. on 2 Feb (DC5).

BLUE GROSBEAK: female on St. Marks CBC on 17 Dec (BN2, DE2) and later on 13, 27 Jan (DS1); female at St. George Island (Franklin Co.) on 8 Feb (RW1); 2 in Titusville (Brevard Co.) on 22 Feb (BH2, SH1).

PAINTED BUNTING: male in S Jacksonville on 17 Jan and 4 Feb (MD1).

GRASSHOPPER SPARROW: 1 at Alligator Point (Franklin Co.) on 13 Jan (BN2, DE2); 2 on Lake Wales CBC (Polk Co.) on 29 Dec; 11 in Winter Haven area (Polk Co.) on 10 Feb (PF1, PT2).

FOX SPARROW: 1 at St. George Island SP (Franklin Co.) on 2 Dec (DE2) was unusual; several other reports from Wakulla (DE2) and Leon Cos. (DE2, TM2, DL3); 1 at Paynes Prairie SP (Alachua Co.) on 26 Jan (CP2).

LARK SPARROW: imm. at Paynes Prairie SP (Alachua Co.) on 26 Dec (TR1), rare in winter.

CLAY-COLORED SPARROW: 2 in Brevard Co. on 2 Feb (m. obs.); 3 in Polk Co. on 10 Feb (PF1, PT2).

HENSLOW'S SPARROW: 1 in Polk Co. on 9 Feb (TP1).

LE CONTE'S SPARROW: 1 S of Wewahitchka (Gulf Co.) on 6 Jan (m. obs.).

LINCOLN'S SPARROW: 1 on Lakeland CBC on 15 Dec, first count record.

WHITE-CROWNED SPARROW: imm. at Wards Bank (Duval Co.) on 7 Dec (PP1); 3 in Titusville (Brevard Co.) on 2 Feb (m. obs.); 17 in Winter Haven (Polk Co.) on 10 Feb (PF1, PT2).

DARK-EYED JUNCO: 1 in Gainesville on 13 Dec (BM3) and 31 Jan (DW2); 1 in S Jacksonville on 19 Dec (JC2); only reports received.

BRONZED COWBIRD: 5 on Lakeland CBC on 15 Dec, in same location as previous year.

ORCHARD ORIOLE: 1 female in Volusia Co. on 31 Dec (BC3).

BREWER'S BLACKBIRD: 2 females on Brooksville CBC (Hernando Co.) on 17 Dec (BP1, DR2); irregular this far south.

PURPLE FINCH: pair in S Jacksonville from 16 to 27 Feb (JC2); 3 in Gainesville on 31 Jan (DW2); 5 in Gainesville from 12 to 26 Jan and 12 from mid Feb to end of period (RR2); 4 at Lake Jackson (Leon Co.) on 10 Feb (DE2, BN2); 9 at Wakulla Springs SP on 17 Feb (DE2).

HOUSE FINCH: several reports from Ft. Walton Beach (Walton Co.) in early Dec (DW1).

PINE SISKIN: 1 near Wakulla Springs SP (Wakulla Co.) on 9 Dec (DE2).

HOUSE SPARROW: 1 along coast at St. Marks NWR (Wakulla Co.) on 2 Dec (DE2, BN2), unusual location.

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ANTLERS OF WHITE-TAILED DEER (*ODOCOILEUS VIRGINIANUS*) FROM INSULAR AND MAINLAND FLORIDA

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Abstract.—We analyzed antler characteristics of the Florida Key deer (*Odocoileus virginianus clavium*) and white-tailed deer from the adjacent Everglades (*O. v. seminolus*). Antler length, antler beam diameter, number of points, and whole body mass of Everglades deer were greater ($P < 0.03$) than those of Key deer in all age-classes. Antler measurements and whole body mass increased ($P \leq 0.0001$) with age in both populations. Antler growth in deer of the Everglades was similar to that reported for other white-tailed deer of the eastern U.S., in which greatest increase in antler size occurred between one and two years of age. For Key deer, greatest increase in antler size between age-classes was delayed one year. Antlers of Key deer do not approach the size of antlers of even yearlings of more northerly white-tailed deer until Key deer are about three years of age. Antlers of deer from the Florida Keys and Everglades became relatively larger ($P \leq 0.0003$) with age.

Brisbin and Lenarz (1984) compared body measurements between insular and mainland populations of white-tailed deer; however, few studies have documented antler characteristics of insular deer or have compared antlers of insular and adjacent mainland white-tailed deer. Of several theories concerning antler function, foremost is that they serve in inter-male competition (Goss 1983). Morphology of deer antlers is influenced by genetic make-up, environmental factors, and age of the animal (Scribner et al. 1989).

The endangered Florida Key deer occupy a group of islands from 8 to 2,400 ha in area located southwest of Miami (Hardin et al. 1984). Antler characteristics of Key deer are of interest because Key deer are the smallest subspecies of white-tailed deer in North America (Hardin et al. 1984), and they live in a subtropical environment at the southernmost region of the conterminous U.S. Key deer have been isolated from most diseases, major predators (Klimstra et al. 1981), and conspecifics

of the Everglades since rising of ocean levels some 4000 years ago (Hoffmeister 1974). Genetic isolation and differing environments for deer of the Keys and Everglades may have resulted in divergence of antler characteristics. Our objectives were to determine relationships of absolute and relative antler size with age and location for deer of the Florida Keys and Everglades.

Methods

Data were recorded at time of necropsy of 501 male Key deer ≥ 1 year of age from 1968 to 1989. Mortalities were mainly a result of collisions with vehicles. Most skulls were cataloged and deposited in the research collection of the Cooperative Wildlife Research Laboratory, Southern Illinois University at Carbondale. Whole body mass and quantitative antler data were recorded when carcass condition allowed. Total number of points ≥ 2.5 cm were counted (spike bucks had two points); beam length was measured from burr to tip on the outside edge of the antler (Smith et al. 1983). Beam diameter was measured 2.5 cm above the burr (Roseberry and Klimstra 1975) with a dial caliper. Values for analyses of beam length and diameter represent an average from the two antlers of individuals. If one antler of a pair was broken, length of the intact antler was included in analyses. Deer were aged according to Severinghaus (1949). Ages of those from 1968 through 1985 were estimated by four deer biologists at an "aging bee," while the others were aged when necropsied. Stage of antler growth (i.e., polished, recently cast, or in velvet) at time of death was analyzed to determine chronology of the antler cycle. Except for description of antler chronology, only non-growing (polished) antlers (n = 217) were included in analyses.

Data from 601 male white-tailed deer were collected 1978-1989 at hunter check-stations in the Everglades and Francis S. Taylor Wildlife Management Area (Broward, Dade, and Palm Beach counties) of the south Florida mainland. Taxonomic status of deer from the Everglades has been uncertain (Layne 1974). According to Baker (1984), deer of south Florida are *O. v. seminolus*. Methods of data collection were similar to those used for Key deer, but only dressed weights were recorded. To allow comparisons with Key deer, regression relationships (R. W. Ellis, pers. comm.) based on previous studies of these deer were used to estimate whole body mass from dressed weights. The equation for yearlings was $Y = 3.158 + 1.355X$ ($n = 40$, $R^2 = 0.961$), for 2-year-olds was $Y = 8.067 + 1.284X$ ($n = 29$, $R^2 = 0.953$), and for 3-year olds was $Y = 14.208 + 1.196X$ ($n = 10$, $R^2 = 0.903$). Chronology of antler development could not be determined for mainland deer because data were collected mainly when antlers were polished (September - December). Data from Everglades deer may be biased if hunters selected for larger deer. However, potential for this bias was reduced by accounting for age in analyses.

Data for Key deer were collected over a longer period (1968-1989) than those available for mainland deer (1978-1989). Therefore, we adjusted the Key deer data to prevent potential biases associated with differences in years of collection. To adjust the Key deer data set, t-tests were used to compare means of whole body mass and antler measurements in each age-class, between time periods 1968-1977 and 1978-1989. When a variable differed ($P \leq 0.05$) between times, only data from 1978-1989 (time of collection for mainland deer) were included in analyses for that variable.

One-way ANOVAs for unbalanced designs were used to test for age effects on whole body mass, antler length, and beam diameter within deer of the keys (age-classes 1, 2, 3, 4, 5, and 6+ years) and mainland (age-classes 1, 2, and 3 years). Tukey's studentized range tests were used to distinguish differences among means. We used two-way ANOVA to determine if significant interactions occurred between location and age (age-classes 1, 2, and 3). We did not interpret the main effects from the two-way analyses because by using

one-way ANOVAs described above, we were able to test for age effects using all age-classes of Key deer, whereas in the two-way we used only ages represented for both locations. T-tests were used to compare means of antler measurements and whole body mass between locations within age-classes 1, 2, and 3 years.

Transformations of data for total points failed to correct problems of non-normality and heteroscedasticity, so we used methods for analyzing counts of deer in several total points categories. We used log-linear analyses within each location for comparing distributions of point values across ages (analog of one-way ANOVAs for other variables described above), and another log-linear analysis for testing significance of interaction across age and locations (analog of two-way ANOVA described above). Log-linear analyses were also used within each age-class to determine if distribution of points varied by location (analog of t-test). Three categories for number of points were identified: two points (spikes), 3-4 points (forks), and ≥ 5 points.

We examined relative (proportional) antler size using antler beam diameter in relation to whole body mass. Beam diameter was used because it was highly correlated with antler volume in wild (Rogers and Baker 1965) and confined (McCullough 1982) populations of white-tailed deer. Therefore, of variables considered in this study, beam diameter may best represent the actual size (volume) of antlers. We used ANCOVAs with whole body mass as the covariate to test for differences in relative antler size among ages for each population. A third ANCOVA, with body mass and age-class (1, 2, and 3) as covariates, was used to test for differences in relative antler size between deer of the Keys and Everglades.

RESULTS

Whole body mass of yearlings ($P = 0.0491$) and antler length of 2-year olds ($P = 0.0442$) differed between the time periods 1968-1977 and 1978-1989 for Key deer. For these age-specific variables, data for Key deer were adjusted to facilitate comparisons with data from mainland deer by including only the samples from the latter time period.

Key deer with polished antlers were collected from late August through March, with a mean of 25 November (SD = 51 days). Based on mortality data and observations of live Key deer, some males shed their antlers as early as late February or as late as April. The mean date for male deer showing no antlers was 7 April (SD = 20 days). The period of antler growth ranged from mid-March through late August, with a mean of 7 June (SD = 34 days).

We analyzed beam diameter to test for asymmetry between the two antlers of individual Key deer. Of 48 racks, 13 had larger diameters on the right, 16 had larger diameters on the left, and 19 had diameters the same on both sides. Therefore, asymmetry between the two antlers of individuals was common. However, on a population basis, a paired t-test indicated no difference ($t = 0.18$, $P = 0.8608$) between left and right antlers. Analyses of antler measurements of other white-tailed deer populations showed similar results (McCullough 1982, Smith et al. 1983). We did not test for asymmetry of antlers in Everglades deer because available data represented mean values of the two antlers, rather than individual values.

The different measurements of antler size of deer from both the Florida Keys and mainland were highly inter-correlated (Table 1). Relationships of whole body mass with antler measurements, and beam diameter with antler length for deer of mainland Florida were highly significant but weaker ($P \leq 0.05$, z-tests for two independent r's) than those for Key deer.

Whole body mass, antler length, and beam diameter of both Key deer and mainland deer increased with age (Table 2). For Key deer, statistical differences were not shown for any measurement between ages one and two, but were shown for antler length between ages two and three. Greatest increase in antler size for consecutive age-classes of Key deer occurred between the ages of two and three for beam diameter and length. For deer of mainland Florida, greatest increase between consecutive age-classes occurred between ages one and two for all variables (Table 2). These differences in growth patterns resulted in significant location by age interactions (Table 2) for antler length and whole body mass.

Number of antler points increased ($P \leq 0.0001$) with age in deer of the Keys and mainland (Table 3). Deer of the mainland showed greater ($P < 0.03$) numbers of points than Key deer in all age-classes. The ratio of racks with greater than two points to two points for yearling Key deer (0.16) and Everglades deer (1.13) showed that yearling bucks from the Everglades were about seven times more likely than Key deer to have racks with greater than two points (Table 3). A significant interaction

Table 1. Correlation coefficients (n in parentheses) for the relationships of age-class (one, two, or three years), whole body mass, and antler characteristics in deer from the Florida Keys and mainland. All r-values are significant ($P \leq 0.0001$, except beam diameter and age in Key deer, $P = 0.0093$).

	Antler length	Beam diameter	Body mass	Age
Florida Keys				
Total points	0.77 (71)	0.88 (17)	0.71 (91)*	0.47 (127)
Antler length		0.97 (12)*	0.84 (51)**	0.54 (71)
Beam diameter			0.94 (10)*	0.61 (17)
Body mass				0.34 (102)
Florida mainland				
Total points	0.81 (445)	0.78 (444)	0.57 (434)*	0.38 (455)
Antler length		0.86 (507)*	0.66 (491)**	0.44 (513)
Beam diameter			0.67 (489)*	0.43 (511)
Body mass				0.40 (572)

*$P \leq 0.05$ for H_0: $r_{\text{Florida Keys}} = r_{\text{Florida Mainland}}$
**$P \leq 0.01$ for H_0: $r_{\text{Florida Keys}} = r_{\text{Florida Mainland}}$

for location and age was not detectable ($P = 0.3159$), suggesting that the rate of increase in points with age did not differ between deer of the Keys and mainland.

Means for whole body mass, antler length, and beam diameter of Everglades deer were greater than those of Key deer in all age-classes (P 0.02 for all t-tests). Deer from the Everglades, on average, had antlers 1.56-3.07 times longer with beam diameters 1.28-1.4 times larger than antlers of Key deer (Table 2). Everglades deer averaged 1.61-1.73 times the body mass of Key deer. Antlers of Key deer do not approach the size of antlers of even yearlings of more northerly (South Florida, South Carolina, Illinois, Michigan) white-tailed deer until Key deer are about three years of age (Fig. 1). Antlers of deer from mainland Florida were smaller than those of more northerly deer, with differences being greatest for 3-year olds (Fig. 1).

Relative antler size, expressed as antler beam diameter adjusted for effects of whole body mass (Fig. 2), increased with age in Key deer ($F = 7.0$, $P = 0.0003$) and Everglades deer ($F = 17.8$, $P \leq 0.0001$). Relative antler size did not differ ($F = 0.21$, $P = 0.6506$) between Keys and Everglades deer.

Table 2. Whole body mass and antler measurements [$\bar{x} \pm$ SE (n)] for male deer with polished antlers. Means within columns for the two locations are not different ($P \leq 0.05$) when followed by the same letter.

Location age (years)	Whole body mass (kg)	Antler length (cm)	Beam diameter (mm)
Florida Keys			
1	27.2 ± 1.2 (30)A	7.9 ± 0.9 (39)A	13 ± 1 (7)A
2	28.6 ± 1.0 (34)AB	8.2 ± 1.5 (12)A	15 ± 1 (4)AB
3	32.8 ± 1.1 (38)BC	18.2 ± 2.0 (20)	18 ± 2 (6)AC
4	35.5 ± 1.3 (20)CD	26.5 ± 2.2 (10)B	19 ± 1 (8)BC
5	36.4 ± 1.0 (23)CE	28.7 ± 1.9 (11)B	20 ± 1 (12)C
6+	41.1 ± 2.0 (16)DE	31.9 ± 0.9 (11)B	22 ± 1 (11)C
F (age)	15.7	45.8	9.6
P	0.0001	0.0001	0.0001
Florida mainland			
1	43.8 ± 0.4 (332)A	17.6 ± 0.5 (284)A	17 ± 0.3 (281)A
2	49.6 ± 0.5 (205)B	25.2 ± 0.6 (192)B	21 ± 0.3 (193)B
3	53.2 ± 1.0 (35)C	28.4 ± 1.4 (37)B	23 ± 0.9 (37)C
F (age)	56.8	66.9	60.0
P	0.0001	0.0001	0.0001
F (location by age)	2.9	3.8	0.5
P	0.0545	0.0238	0.5011

Table 3. Proportions of antler racks containing 2, 3-4, and ≥ 5 points.

Location age (years)	Antler points 2	3-5	≥ 5	Total racks
Florida Keys				
1	0.86	0.08	0.06	48
2	0.72	0.13	0.15	39
3	0.30	0.30	0.40	40
4	0.10	0.15	0.75	20
5	0	0.10	0.90	30
6+	0	0.21	0.79	24
Florida mainland				
1	0.47	0.28	0.25	247
2	0.18	0.28	0.54	175
3	0.12	0.15	0.73	33

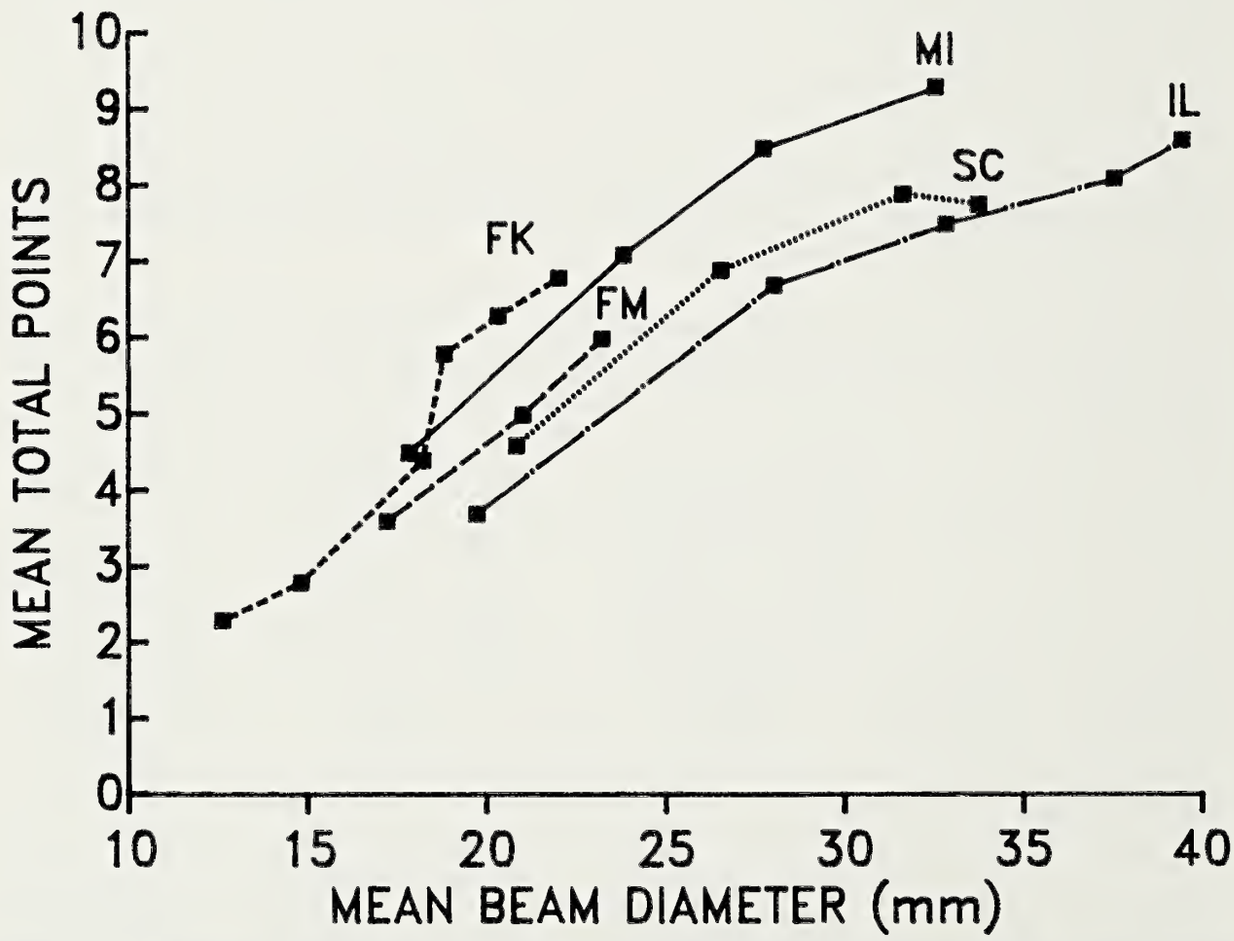

Figure 1. Age-specific antler characteristics (by age-class) of yearling and older white-tailed deer from the eastern U.S. Data for the Florida Keys (FK) and the Everglades of Florida mainland (FM) are from this study. Data from Michigan (MI) are from McCullough (1982), South Carolina (SC) are from Smith et al. (1983), and Illinois (IL) are from Roseberry and Klimstra (1975).

DISCUSSION

Chronology of antler development for Key deer was generally similar to that of other white-tailed deer populations in the southeastern U.S. Growth of antlers in deer of the Everglades occurs about the same time as for Key deer, but Everglades deer shed antlers earlier (late Nov. to Jan., Loveless 1959). White-tailed deer of Blackbeard Island, Georgia also cast antlers as early as November (Osborne 1976). The antler cycle of deer in Mississippi was similar to that of Key deer, showing an identical mean date (7 April) of antler casting (Jacobson and Griffin 1983).

Correlations of body mass with antler measurements and beam diameter with antler length were stronger for deer of the Keys than Everglades. This may be a result of less variation in physical attributes

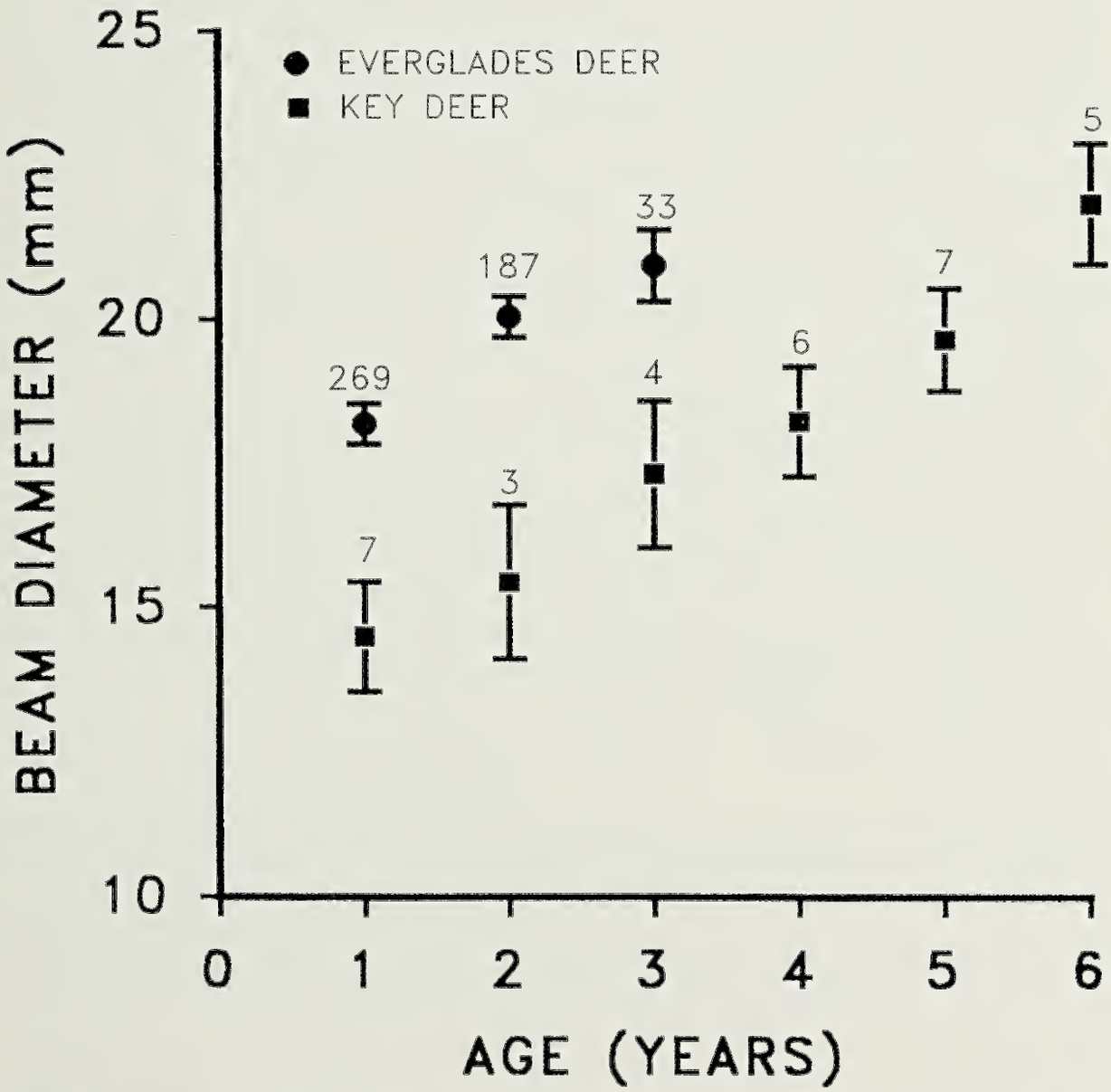

Figure 2. Means (± SE) of antler beam diameter, adjusted through ANCOVA for each population, to remove effects of whole body mass. Sample sizes are above error bars.

of Key deer due to small (250-300) population size (gene pool) and associated inbreeding due to confinement to islands.

Greatest increase between consecutive age-classes for means of antler measurements was later in Key deer than for deer of mainland Florida (this study), Michigan (McCullough 1982), Illinois (Roseberry and Klimstra 1975), and South Carolina (Smith et al. 1983), all of which showed greatest increases in antler characters between age-classes one and two (Fig. 1). Female Key deer reflect a similar pattern; they attain peak productivity later in life than other white-tailed deer of North America (Folk and Klimstra 1991). These delays in maturation for male and female Key deer may be associated with a deficiency of nutrients such as phosphorus (Widowski 1977) and/or other limiting aspects of their island environment.

Antler beam diameter, number of points, and body mass increase with latitude in white-tailed deer of North America (Smith et al. 1983, Baker 1984). Artiodactyls on islands are usually smaller than those on adjacent mainland (Foster 1964, Lomolino 1985). Our findings for deer from the Florida Keys and Everglades are consistent with these patterns. However, data presented for the George Reserve deer herd of Michigan (Fig. 1) represent an obvious departure. We would predict that the Michigan curve would be to the right of the other curves, but instead, these deer exhibit relatively small beam diameters. McCullough (1982) suggested that the uniqueness of antlers in these confined deer may be a result of the founder principle because the herd's source was based on only two males.

Greater mean numbers of points in Key deer for beam diameters 18-22 mm (Fig. 1) are probably a function of age in combination with their relatively small antlers. Key deer attain their maximum number of points at diameters shown by more northerly deer at much younger ages.

Proportionally larger antler size with age in deer of the Florida Keys and Everglades is not surprising because such positive intraspecific allometry (Gould 1966) is common for deer (Goss 1983).

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Data for Everglades deer were provided by J. W. Ault, S. P. Coughlin, R. W. Ellis, and D. B. Johnson of the Florida Game and Fresh Water Fish Commission. Data for Key deer were obtained from the National Key Deer Refuge and by personnel of the Cooperative Wildlife Research Laboratory at Southern Illinois University. We thank M. L. Folk for constructive comments on the manuscript and C. T. Moore for statistical advice. This project was funded by the Richard King Mellon Foundation.

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NOTES

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A BANDED RED KNOT SEEN AT THE DRY TORTUGAS

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Despite its status as a regular, locally abundant transient and winter visitor on both coasts of peninsular Florida, the Red Knot (*Calidris canutus*) is at best occasional and rare at the Dry Tortugas (Robertson 1986). We know of only three records prior to our sighting of an individual on 31 May to 1 June 1988. The previous records also are from spring: seven individuals seen by A. D. Cruickshank, 12 May 1956 (Sprunt 1962: 82), one seen by a group of observers, 12 May 1963 (Robertson and Mason 1965), and one desiccated specimen, largely in spring plumage, which W.B.R. found on Bush Key, 16 June 1977, and donated to the University of Miami Museum (UMRAC 10360). The bird we discuss here also had some breeding plumage.

The fact that the bird we saw was color-banded and flagged (green flag, yellow and red bands on the right leg, top to bottom; metal, orange, and red bands on the left leg, top to bottom) provides support for our field identification. It was marked as a Red Knot by Brian A. Harrington on Delaware Bay, at Reed's Beach, Cape May County, New Jersey, on 15 May 1986. It was seen there again on 25 May 1986, and a year later on 23 May 1987.

Robertson (1986) lists ten species of sandpipers and plovers that are common (i.e., more than 20 records per season) in spring at the Dry Tortugas. These include three species, Sanderling (*Calidris alba*), Ruddy Turnstone (*Arenaria interpres*), and Black-bellied Plover (*Pluvialis squatarola*), that occur in habitats commonly frequented by Red Knots in other areas. Among the nine species of sandpipers and plovers seen during our 24 May to 1 June 1988 visit to the Tortugas were a few turnstones and black-bellies. We suggest that some reason other than lack of acceptable habitat accounts for the infrequent occurrence of Red Knots at the Dry Tortugas.

The Dry Tortugas is a coral atoll situated in the Gulf of Mexico 117 km west of Key West at 24°40′N, 82°50′W. Recent work by Harrington and colleagues on New World Red Knots (*C. c. rufa*) suggests that the Dry Tortugas is outside the normal migratory pathways of the species. Harrington et al. (1988) describe two widely disjunct wintering populations. The larger (ca. 100 000 birds) winters along the Atlantic coast of Patagonia, the smaller (ca. 10 000 birds) primarily on the Gulf coast of Florida. Neither population's usual migration routes include the Gulf of Mexico. Red Knots wintering in South America depart from North America at the latitude of southern New Jersey or farther north and fly over the Atlantic Ocean to the Guianas. Their spring return from South America also follows a course well east of, but closer to, the Florida peninsula, where good numbers occur along the east coast. Red Knots wintering along the Gulf coast of Florida move down the Atlantic coast to about Jacksonville and then may fly over the Florida peninsula to the Gulf coast (Harrington et al. 1982). The relative scarcity of Red Knots in fall along the Atlantic coast of Florida south of Cape Canaveral (Harrington et al. 1982), in the Florida Keys (Hundley and Hames 1961), and along the western panhandle coast (Loftin et al. 1987, Duncan 1988) supports this opinion. The fact that many of the 210 knots color-banded in Collier Co. during the past 6 years have been sighted locally, but none has been seen farther south (Below, pers. comm.) suggests the Gulf coast population rarely strays farther south.

Red Knots that reach the Dry Tortugas would appear less likely to come from the population wintering on the nearby Florida Gulf coast than from the Patagonian population, despite the fact that the Dry Tortugas is well removed from the population's ordinary flyway. Furthermore, according to Harrington et al. (1988), spring migrants from the population wintering on the Florida Gulf coast tend to by-pass New Jersey, where our individual was seen in two successive springs. We speculate that the knot we saw—and others from the Dry Tortugas—is likely to have been a member of the population that winters in Patagonia.

We thank Brian Harrington and Ted Below, both former frequent Tortugas visitors, for supplying unpublished data on marked knots, and them and Henry Stevenson for reviewing our manuscript.

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INCORRECT IDENTIFICATION OF A RED-THROATED LOON AS A PACIFIC LOON BASED ON BILL SHAPE

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On the lower Wakulla River (Wakulla Co.), 14 Dec. 1971, I collected a loon that appeared to fit the description of the Pacific Loon (*Gavia pacifica*). This specimen was placed in the Tall Timbers Research Station collection and is referred to as TTRS 2783. Also in the TTRS collection are a Red-throated Loon (*G. stellata*) taken by Lovett Williams, Jr., on the St. Marks River, 3 Jan. 1957 (TTRS 2827), and one taken from a small lake in Tallahassee on 4 Jan. 1978 (TTRS 3592). The bird taken in 1957 had the upturned bill (culmen) commonly attributed to *G. stellata*, but the other two had bills as straight as a Common Loon's (*G. immer*), but shorter and more slender.

After examining these specimens in October 1990, W. B. Robertson, Jr. and G. E. Woolfenden pointed out that the three specimens appeared to represent a single species.

When the two doubtful specimens (with straight bills) were sent to R. W. Storer at the University of Michigan Museum of Zoology for examination, both were pronounced *G. stellata.*

TTRS 2783 had been erroneously referred to as a Pacific ("Arctic") Loon in *American Birds* (Stevenson 1972), the *Florida Field Naturalist* (Kittleson 1976), and the book *Vertebrates of Florida* (Stevenson 1976); it was also alluded to in the *Florida Field Naturalist* (Hopkins and Woolfenden 1977). The removal of this record from the list of Pacific Loons in this state leaves 12 possibly credible records, including the following specimens: skeletons from Lake Worth, 21 Nov. 1959 (USNM 431142, National Museum of Natural History), and the Dry Tortugas, 20 April 1976 (GEW 5024, Archbold Biological Station), and a skin from Indian Rocks Beach, 12 April 1976 (GEW 5000). Sight reports come from Pensacola, winter of 1982-1983 to 20 May 1983 (Ortego 1983, Imhof 1983); near Jacksonville, 26 Dec. 1983 Langridge 1984, (Markgraf and Powell 1984); Wakulla Beach (Wakulla Co.), 15 Dec. 1959 (James and Stevenson 1980); Dry Tortugas, one of two records there (see above; Robertson 1986); Pensacola, 6 June 1986 and 3 May 1987 (Duncan 1988); Santa Rosa Island, 1 June 1988 (Imhof 1988; Duncan 1988), and 18 June 1988 (Jackson 1988); and one at Perdido Bay, 1 Jan. 1986 (Muth 1986). Gaither and Gaither (1968) published a sighting of a supposed Pacific Loon at Shalimar (Okaloosa Co.), 26 June-30 July 1967, but the photograph suggested a Common Loon (*G. immer*) in basic plumage.

Field guides and other references often tend to emphasize bill shape as important to the separation of Pacific and Red-throated loons in the field, stating that the bill of *G. stellata* is "upturned," "upcurved," or "uptilted." There is some question as to whether it is bill shape or bill orientation that is described. An examination of 11 field guides and references revealed partly contradictory or unclear information about "bill" shape, and the shape of each manible was seldom clarified. Two of the more helpful references were Forbush (1925)—"Bill *varies* . . . but *usually* . . . concave at nostrils. . ." (emphasis added), and Palmer (1962), in which a sketch of a "juvenal" Red-throated Loon by R. M. Mengel shows an essentially *straight*, slender bill. Whenever bill shape is the only criterion used in separating these two loons, errors are sure to occur.

Some of the references examined gave other criteria for separating *stellata* from *pacifica* in basic plumage. A plate in Godfrey (1966) showed solidly dark upperparts for the winter adult of *pacifica*, as in the common Loon. A painting in Natl. Geogr. Soc. (1983) showed a conspicuous dark line on each side of the neck, separating the gray dorsal from the whitish ventral sides; also a dark necklace around the throat. Both of the latter features are discussed by Walsh (1988), who added that *pacifica* often has a dark streak across the vent. Probably neither the chinstrap or the vent strap occurs in all Pacific Loons; Roberson (1989) found that 80% of the specimens he examined in the Museum of Vertebrate Zoology "showed an obvious chinstrap." Langridge (1984) emphasized the importance of using a variety of field marks in the identification of *pacifica.*

Most authors point out a difference in back pattern in these two loons, the scapulars and feathers on the mantle of *pacifica* having whitish edges that form a scalloped effect and those of *stellata* showing rounded white spots. In general, the Pacific Loon in winter resembles the Common Loon (*G. immer*) except for its smaller size and more slender bill.

I thank Peter Merritt and Bill Robertson for several useful and pertinent comments on my first draft.

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ANOTHER CASE OF BLUE JAY KLEPTOPARASITISM

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Robert Loftin's note on kleptoparasitism in a Florida Blue Jay (*Cyanocitta cristata*) (1991, Fla. Field Nat. 19: 55) prompts me to report similar behavior in the species from the western edge of its range. Our home in Dickinson, Galveston County, Texas, is situated in mature riparian forest, with large oaks predominating. Blue Jays are abundant and probably the dominant species in the neighborhood. Shortly after we moved there in late 1987, we put up a feeder in the backyard and supplied it with sunflower and mixed seeds. As resident and wintering birds began to visit the food, I noticed on several occasions that a Blue Jay in the dense woodlot next door gave a vocal imitation of a Red-shouldered Hawk (*Buteo lineatus*), which caused birds already on the feeder to fly off; the jay then flew in,

landed on the feeder, and began to eat sunflower seeds. I have paid particular attention to the success of this "ploy" to clear the feeder of competitors and have never heard the jay give a hawk vocalization before approaching the feeder from the woodlot *unless* there were other birds, usually Northern Cardinals (*Cardinalis cardinalis*) or Common Grackles (*Quiscalus quiscula*), already feeding there. On hearing the hawk call, the other birds immediately fly up into the tall trees above or into the woodlot's heavy cover about 7 meters away. Red-shouldered Hawks are a common breeding species in the immediate area. In my experience, the hawk call has never failed to clear the feeder well before the jay landed on its perch. If no other birds were at the feeder when a Blue Jay flew in, it did so silently.

I have observed this behavior repeatedly for more than three years and, although the jays are not banded so that I cannot distinguish individuals, because it has occurred so frequently over a number of years, I suspect that more than one jay has learned the effectiveness of this deception. I am also convinced that use of a predator call to frighten other birds away from food is habitual behavior in at least one individual in this Texas jay population. Loftin's report of a similar incident was therefore not isolated or unique to a Florida jay and Hailman's proposed hypothesis (1990, Fla. Field Nat. 18: 81-82) that jays' predator calls may serve "to deceive some third species into believing a raptor is present" is further supported.

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AN OVERLOOKED EARLY FLORIDA OOLOGIST AND ORNITHOLOGIST, JOSEPH E. GOULD

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Born on St. Simons Island, Georgia on 8 January 1866, Joseph Edward Gould followed a railroading career for most of his life. He died in Norfolk, Virginia, on 3 November 1945. As a young boy growing up on the island, he became keenly interested in birds and began egg collecting. During his early adult life in Ohio and other parts of the midwest and southern states, he added to his egg collection. At the time of his death, his egg collection contained 588 sets from 167 species, mostly from Ohio, Indiana, and coastal Georgia (Johnston in press, 1989). His collection was given to Almon O. English in Roanoke, Virginia, who subsequently gave it to the Charleston (SC) Museum where the collection (in poor condition) is currently being catalogued. Further details of Gould's life are found in Bailey (1945), English (1948), and Johnston (in press, 1989).

Recently, Mrs. Almon O. English gave me Gould's catalog and much correspondence. A review of that material reveals important facts about Gould's activities in Florida. Because Gould was overlooked by Bailey (1925) and unknown to Howell (1932), some notable aspects of his Florida collecting and observations are presented here. It is surprising that Bailey did not mention Gould in his "Birds of Florida" (1925), because he had known Gould since at least 1906 from their field exploits in southeastern Virginia. In fact, all of Gould's egg collecting in Florida preceded the publication of Bailey's book. Although his egg collection contained 81 sets from 33 species in Florida (Table 1), none of them is an exceptional record, but they do confirm breeding of 33 species in the state between 1895 and 1920.

From 1915 to 1921, Gould worked for the Charlotte Harbor and Northern Railroad and lived in Arcadia, Florida. Even as late as 1941, he and his wife, Jessie, periodically returned for short visits to St. Simons Island and Arcadia. His collecting localities were concentrated

Table 1. Records of egg sets taken by Joseph E. Gould in Florida.

Species	Date	Egg set	Number of eggs	Location	Notes
Brown Pelican					
(*Pelecanus occidentalis*)	1898	8	3	south Florida	
	1901	1	3	south Florida	
	20 Apr. 1917	2	1	Boca Grande, Charlotte Harbor	
	19 May 1917	3	3	Boca Grande	mangrove tree
	19 May 1917	4	2	Boca Grande	mangrove tree
	19 May 1917	5	2	Boca Grande	mangrove tree
Double-crested Cormorant					
(*Phalacrocorax auritus*)	20 June 1917	1	2	Charlotte Harbor	
Anhinga					
(*Anhinga anhinga*)	25 March 1905	1	3	Lake City	
	25 March 1905	2	3	Lake City	
	25 March 1905	3	3	Lake City	
	25 March 1905	4	4	Lake City	
Great Blue Heron					
(*Ardea herodias*)	5 April 1903	1	2	Haines City	
Yellow-crowned Night-Heron					
(*Nycticorax violaceus*)	25 April 1919	1	2	Ona	
	25 April 1919	2	2	Ona	
	1 May 1919	3	4	Limestone	
	1 May 1919	4	3	Limestone	

Table 1. (continued)

Species	Date	Egg set	Number of eggs	Location	Notes
White Ibis					
(*Eudocimus albus*)	29 April 1901	1	3	Charlotte Harbor	
	19 May 1917	2	2	Charlotte Harbor	
	19 May 1917	3	2	Charlotte Harbor	
	19 May 1917	4	3	Charlotte Harbor	
	19 May 1917	5	3	Charlotte Harbor	
Wood Stork					
(*Mycteria americana*)	23 April 1901	1	2	Haines City	
	21 April 1902	2	2	Haines City	
Black Vulture					
(*Coragyps atratus*)	21 May 1902	1	2	Lakeland	hollow cypress
	21 May 1902	a	2	Lake County	ground
	23 Feb. 1918	3	2	Arcadia	ground
	23 Feb. 1918	4	2	Arcadia	ground
Purple Gallinule					
(*Porphyrula martinica*)	24 April 1901	2	5	Lake City	
	24 April 1901	3	7	Lake City	
Sandhill Crane					
(*Grus canadensis*)				Haines City	
Wilson's Plover					
(*Charadrius wilsonia*)	25 May 1916	1	2	Boca Grande	
	7 July 1917	2	4	Boca Grande	
Mangrove Cuckoo					
(*Coccyzus minor*)		a	4	Boca Grande	

Table 1. (continued)

Species	Date	Egg set	Number of eggs	Location	Notes
Eastern Screech-Owl (*Otus asio*)	5 April 1919	5	3	Arcadia	flicker hole
Burrowing Owl (*Athene cunicularia*)	8 April 1911	1	6	Manatee County	
	8 April 1911	2	6	east of Arcadia	
	8 April 1911	3	2	east of Arcadia	
	1 April 1917	4	5	east of Arcadia	
	1 April 1917	5	5	east of Arcadia	
Common Nighthawk (*Chordeiles minor*)	17 May 1916	1	2	Arcadia	
	21 May 1916	2	2	Arcadia	
	28 May 1916	3	2	Arcadia	
	21 May 1916	4	2	Arcadia	
Chuck-will's-widow (*Caprimulgus carolinensis*)	15 May 1903	7	2	Lakeland	
	21 May 1903	8	2	Bartow	
Chimney Swift (*Chaetura pelagica*)	8 June 1920	2	4	Arcadia	
Great Crested Flycatcher (*Myiarchus crinitus*)	5 June 1908	5	5	Arcadia	
Eastern Kingbird (*Tyrannus tyrannus*)	9 July 1916	7	3	Arcadia	live oak

Table 1. (continued)

Species	Date	Egg set	Number of eggs	Location	Notes
Gray Kingbird					
(*Tyrannus dominicensis*)	6 June 1916	1	4	Boca Grande	mangrove
	4 June 1919	2	3	Boca Grande	mangrove
	7 June 1919	3	3	Boca Grande	mangrove
Blue Jay					
(*Cyanocitta cristata*)	28 March 1916	a	4	Arcadia	orange tree
Scrub Jay					
(*Aphelocoma coerulescens*)	25 March 1911	1	4	Manatee County	scrub oak
	18 April 1915	2	4	Volucia (sic) County	scrub oak
	18 April 1915	3	3	Volucia (sic) County	scrub oak
Carolina Wren					
(*Thryothorus ludovicianus*)	24 April 1916	a	5	Arcadia	oak stump
	8 June 1916	b	4	Boca Grande	cabbage palmetto
Northern Mockingbird					
(*Mimus polyglottos*)	22 April 1916	6	4	Arcadia	oak
Loggerhead Shrike					
(*Lanius ludovicianus*)	4 April 1895	1	5	Arcadia	
	4 April 1913	3	5	Manatee	oak
White-eyed Vireo					
(*Vireo griseus*)	10 April 1905	6	4	Marianna	

Table 1. (continued)

Species	Date	Egg set	Number of eggs	Location	Notes
Black-whiskered Vireo (*Vireo altiloquus*)	12 June 1919	1	3	Boca Grande	mangrove
Summer Tanager (*Piranga rubra*)	6 May 1905	6	4	Marianna	oak
	2 April 1911	7	3	Marianna	elm
Northern Cardinal (*Cardinalis cardinalis*)	27 May 1911	1	3	Lakeland	
	22 April 1916	2	3	Arcadia	
	23 April 1916	3	3	Arcadia	
Red-winged Blackbird (*Agelaius phoeniceus*)	16 July 1916	6	3	Arcadia	palmetto
Eastern Meadowlark (*Sturnella magna*)	20 April 1919	a	4	east of Arcadia	
	20 April 1919	b	3	east of Arcadia	
	24 April 1919	1	4	east of Arcadia	
Boat-tailed Grackle (*Quiscalus major*)	29 March 1916	8	3	McCall	cattails
	29 March 1916	9	3	McCall	cattails
	2 April 1916	10	3	Bradley Junction	cattails
	2 April 1916	11	3	Bradley Junction	cattails
	2 April 1916	12	3	Bradley Junction	cattails
	23 April 1916	13	3	Arcadia	cabbage palmetto
Common Grackle (*Quiscalus quiscula*)	27 April 1905	1	3	Lake Butler	
	27 April 1912	2	3	Leesburg	
	27 April 1912	3	4	Leesburg	
	20 March 1916	4	5	Arcadia	oak

near Arcadia (Lakeland, Haines City, Charlotte Harbor) but he also took eggs at Marianna and Leesburg. His field notes mention 141 species around Arcadia, including an old Northern Harrier (*Circus cyanea*) nest on 25 September 1915 near Arcadia: "some seen throughout the year. I found an old nest in grass on prairie near pond." Bailey (1925) reported that some harriers remain throughout the summer but gave nothing specific about nests, and Howell (1932) mentions three nests all in the northern part of the state.

On 24 October 1938, Gould wrote to Almon English in response to an earlier letter from English about a Swallow-tailed Kite (*Elanoides forficatus*) shot near Salem, Virginia. In addition to commenting on his observations of this kite on St. Simons Island when he was a boy, Gould went on: "Some years [ago] while spending a week in Florida near Lakeland with my brother, we sat down for a rest on the edge of a large cypress swamp and watched a [Swallow-tailed] kite, which had its nest in the tip top of a pine about 12″ in dia. and at least 75 ft. up. While so occupied an Ivory bill woodpecker came out of the swamp an [sic] lit with in 30 ft. and began preening its feathers. From its action, it had just come off its nest back in the swamp to get some sun shine. After spending about 20 min. at it, it flew back & out of sight. Such a co-incidence would not happen again in a life time."

Joseph Gould published very little, even though he had been a member of the American Ornithologists' Union for more than 50 years, and was a charter member of the Virginia Society of Ornithology. In addition to two notes in the *Auk* and scattered notes and references in the *Raven* on Virginia birds, he published a note on the Louisiana Waterthrush (*Seiurus motacilla*) breeding near Arcadia on 29 April 1915 (Gould 1933). This appears to be the first breeding record for the species in Florida.

Gould has been described as a quiet, dedicated person who often embellished his recollections of field experiences with humor (Bailey 1945, English 1948). For example, he once spent hours at Arcadia trying to locate an Eastern Meadowlark's (*Sturnella magna*) nest in thick wire grass and dwarf palmettos, and was about to give up when he inadvertently tapped an old rusty lard can, mashed almost flat, when "out flew the lark." Gould personally collected nearly all of his 588 egg sets, for, as he wrote, "I collected only for myself, and not to trade or sell, and only sufficient sets of each species to illustrate the variations in size, color, and number."

I am grateful to Mrs. Almon English for making Gould's records available, and to Glen E. Woolfenden and two anonymous referees for offering comments on this paper.

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GREAT HORNED OWL PREDATION OF ATLANTIC LOGGERHEAD TURTLE HATCHLINGS

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The Atlantic loggerhead turtle (*Caretta caretta caretta*) is the most abundant of the three species of endangered or threatened marine turtles that regularly nest in Florida (Ehrhart and Witherington 1987, Dodd 1988). The most extensive nesting by this species in the Western Hemisphere occurs along the Atlantic coast between Cape Canaveral and Jupiter Inlet. Along this stretch of coast, sand compaction from motorized beach sweeping machinery often has an adverse impact on the reproductive success of loggerhead turtle nests (Conley and Hoffman 1986, Ehrhart and Witherington 1987, Iverson and Etchberger 1989).

To minimize compaction-related damage to loggerhead turtle nests from beach-sweeping machinery on 3.5 mi (2.2 km) of city beaches of Vero Beach in Indian River County, the state required the relocation of egg clutches out of the path of the machinery. Since 1987, relocated nests have been placed either in a chain-link hatchery or concentrated near the dune line along an approximately 400 m stretch of South Beach with intact sand dunes. The 100-200 nests relocated to the hatchery each year were, for the most part, protected from predators. However, the response by nest predators to concentrating 50-100 nests into the 400 m section of dune line was undocumented. In June 1989, I began monitoring this section of beach for signs of predation on loggerhead eggs and/or hatchlings via morning, evening, and nocturnal pedestrian surveys. In this note I report predation by Great Horned Owls (*Bubo virginianus*) on post-emergent loggerhead turtle hatchlings concentrated during the nest relocation project in Vero Beach, Florida.

On 2 August 1989, at 1950 h, I observed an adult Great Horned Owl perched 4 m high in a dead cabbage palm (*Sabal palmetto*) on the dune about 25 m from the marine turtle nest relocation hatchery. At least 1 nest emergence had occurred in the hatchery and approximately 75 hatchlings were moving around the hatchery cage perimeter prior to their scheduled release at nightfall. The owl intently observed the crawling loggerhead hatchlings, intermittantly bobbing and swaying its head. About 4 min later the owl flew down and landed on the wire roof of the turtle hatchery where it continued to peer down at the hatchlings for about 45 s. The bird then flew back to its perch in the cabbage palm snag for another 10 min before it flew north up the dune line. On 12 August, at 2200 h, I used a flashlight to check relocated turtle nests along the base of the dunes. At a nest site about 150 m north of the turtle hatchery, I illuminated an adult Great Horned Owl standing in the sand as loggerhead hatchlings emerged. The owl snatched a hatchling with its foot and transferred it to its beak, then quickly flew to an Australian pine (*Casuarina equisetifolia*) snag on the dune about 25 m away. I periodically spotlighted the owl as it consumed the hatchling during the subsequent 7 min.

On 20 August, at 2115 h, I discovered an adult Great Horned Owl perched in the aforementioned Australian pine snag, eating a loggerhead turtle hatchling. After the owl left, I inspected the substrate around the base of the snag for prey remains and/or pellets. A total of 4 hatchling carapaces and 9 pellets was collected. Pellets contained mainly rodent remains, including cotton rat (*Sigmodon hispidus*) and southeastern beach mouse (*Peromyscus polionotus niveiventris*), as well as 2 anterior skull fragments and 3 intact skulls of loggerhead turtle hatchlings. These observations suggest that Great Horned Owls

dissect hatchling soft parts from the shell and do not swallow whole hatchlings as they do with similar-sized rodent prey.

During the summer of 1990 a pair of Great Horned Owls was observed preying on post-emergent loggerhead hatchlings at least 12 times. The owls hunted from several cabbage palm snag perches adjacent to the relocated loggerhead turtle nests. During hatchling emergence an owl would make short (less than 50 m) flights down to the dune line or beach to make easy captures of hatchlings.

Great Horned Owls have a diverse diet reflecting locally available food resources (Craighead and Craighead 1956, Rusch et al. 1972). The diet of this euryphagus owl may vary from year to year and/or seasonally (Korschgen and Stuart 1972, Toland 1985). Reported prey items of Great Horned Owls range in size from 1 to 3000 g (Johnsgard 1988), including insects and scorpions, Canada Geese (*Branta canadensis*), grouse, and herons among birds, and woodchucks (*Marmota monax*), striped skunks (*Mephitis mephitis*), and domestic cats (*Felis catus*) among mammals (Bent 1938, Rusch et al. 1972, Marti 1974, Toland 1985). Most studies of Great Horned Owl food habits report relatively low percentages of reptilian prey (< 2.0% occurrence; Korschgen and Stuart 1972, Jaksic and Marti 1984, Toland 1985). This is the first report of Great Horned Owls preying on Atlantic loggerhead turtles.

The localized, opportunistic predation of loggerhead hatchlings by Great Horned Owls may only minimally impact the region's nesting marine turtle population. However, my observations revealed that a variety of potentially important predators were attracted to the linear nest relocation site, including bobcat (*Felis rufus*), raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), gray fox (*Urocyan cinereoargenteus*), domestic dog (*Canis familiaris*), domestic cat (*Felis catus*), ghost crab (*Ocypode quadrata*), and fire ants (*Solenopsis* sp.). An array of animals prey upon Atlantic loggerhead turtle eggs and hatchlings prior to their entering the ocean (Dodd 1988). Dodd (1988) summarized terrestrial species preying on loggerhead nests throughout the turtle's range, including 7 crabs, 1 ant, 2 lizards, 10 mammals, and 14 birds (mainly corvids and larid gulls). In Florida the major predator of loggerhead eggs is the raccoon which may be responsible for over 90% nest mortality on certain beaches (Ehrhart 1979). Predation on eggs by ghost crabs is also common in Florida, and the crustacean may be the most important predator of post-emergence hatchlings in some areas (Ehrhart and Witherington 1987). Loggerhead hatchling mortality is also inflicted by Fish Crows (*Corvus ossifragus*), Laughing Gulls (*Larus atricilla*), Ring-billed Gulls (*L. delawarensis*), domestic dogs, and fire ants (Ehrhart and Witherington 1987, Dodd 1988, pers. observ.).

I estimated that at least 25% of the relocated, concentrated loggerhead nests were depredated during either the egg or hatchling stages. The cumulative impacts of predation on loggerhead turtle nests relocated to artificially high densities along linear transects could be of local significance on certain nesting beaches, and should be discouraged by permitting agencies. Limiting municipal beach sweeping programs to the use of hand rakes would eliminate the need to relocate sea turtle nests, while facilitating removal of flotsam.

The Vero Beach office of the U.S. Fish and Wildlife Service provided marine turtle nest relocation data. The manuscript benefited from the review by P. Merritt and an anonymous refree.

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REPORT

Fla. Field Nat. 19(4): 119-121, 1991.

FOS Records Committee Report.—This is the eighth report of the Florida Ornithological Society Records Committee, covering 1990. Table 1 contains 33 records of which 26 were accepted and 7 were not accepted. Committee members are Jocelyn Lee Baker (secretary), Wally George, Larry Hopkins, William Robertson and Henry Stevenson.

Sightings of rare birds in Florida should be submitted to the secretary of the Records Committee. All records published thus far have been placed in a permanent file in the FOS Archives at the Florida Museum of Natural History in Gainesville where they are available for research. Documentation for accepted birds listed in this report was submitted by: Barbara Center, Linda Douglas, Robert Duncan, Bernardine English, Wally George, Dave Goodwin, Wayne Hoffman, Howard P. Langridge, Bruce Neville, Steve Nord, Joseph Ondrejko, Thomas Palmer, Harry Robinson, Robert Sargent, P. William Smith and L. W. Timmer.—**Jocelyn Lee Baker**, Secretary, 851 North Surf Road, Apartment #302, Hollywood, Florida 33019.

ERRATA

In the FOS Records Committee Report (1991, Fla. Field Nat. 19(2): 56-57), record No. 88-138, Allen's Hummingbird, the date observed "27 December 88" should read "27-28 February 88." In the FOS Field Observation Committee Report (1991, Fla. Field Nat. 19(3): 90-95), the title "Winter Report: March-May 1991" should read "Winter Report: December-February 1991."

Table 1. FOS Records Committee Report — 1990.

Number	Date received	Species	Date observed	Location (County)	Decision
90-205	9 June 90	Pacific Loon[1]	22 March 90	St. George Island (Franklin)	Not accepted
90-215	9 December 90	Pacific Loon	21 November 90	Santa Rosa Sound (Escambia)	Accepted
90-199	30 April 90	Least Grebe	3 March 90	Naples (Collier)	Accepted
90-183	12 November 89	Black-capped Petrel	4 May 88	off Islamorada (Monroe)	Not accepted
90-214	9 December 90	Black-bellied Whistling-Duck	8 September 90	(Hardee)	Accepted
90-201	17 May 90	White-cheeked Pintail	30 March 90	Merritt Island NWR (Brevard)	Accepted
90-197	22 March 90	Masked Duck	17 January 90	N. of Cedar Key (Levy)	Not accepted
90-212	28 October 90	Mississippi Kite[1]	9 May 90	Key West (Monroe)	Accepted
90-206	10 July 90	Glaucous Gull	19 March 89	Pompano Beach (Broward)	Accepted
90-211	12 October 90	Arctic Tern[1]	5 May 89	near Dry Tortugas (Monroe)	Accepted
90-207	18 July 90	Key West Quail-Dove	14 June 90	North Key Largo (Monroe)	Accepted
90-213	28 October 90	Ruddy Quail-Dove	19 March 89	Big Cypress Preserve (Collier)	Not accepted
90-200	9 May 90	Lesser Nighthawk	30 April 90	Gainesville (Alachua)	Not accepted
90-184	1 March 90	Vaux's Swift	17 December 89	Gainesville (Alachua)	Not accepted
90-196	1 March 90	Buff-bellied Hummingbird	18 December 89	Freeport (Walton)	Accepted
90-198	23 March 90	Buff-bellied Hummingbird	11 January 90	Ft. Lauderdale (Broward)	Accepted
90-195	1 March 90	Ruby-throated Hummingbird[1]	18 November 89	Pensacola (Escambia)	Accepted
90-188	1 March 90	Black-chinned Hummingbird[1]	5 November 89	Pensacola (Escambia)	Accepted
90-189	1 March 90	Black-chinned Hummingbird	12 November 89	Ft. Walton Beach (Okaloosa)	Accepted
90-190	1 March 90	Black-chinned Hummingbird	12 November 89	Ft. Walton Beach (Okaloosa)	Accepted
90-191	1 March 90	Black-chinned Hummingbird	18 December 89	Freeport (Walton)	Accepted
90-193	1 March 90	Black-chinned Hummingbird	18 December 89	Shalimar (Okaloosa)	Accepted
90-194	1 March 90	Black-chinned Hummingbird	19 December 89	Pensacola (Escambia)	Accepted
90-192	1 March 90	Calliope Hummingbird[1]	18 December 89	Ft. Walton Beach (Okaloosa)	Accepted
90-186	1 March 90	Ash-throated Flycatcher[1]	19 January 90	Delray Beach (Palm Beach)	Accepted

Table 1. (continued)

Number	Date received	Species	Date observed	Location (County)	Decision
90-187	1 March 90	Ash-throated Flycatcher	20 January 90	Lake George (Marion)	Not accepted
90-210	24 September 90	Fork-tailed Flycatcher	25 June 90	Shark Valley, ENP (Dade)	Accepted
90-203	23 May 90	Bahama Mockingbird	20 May 90	Bill Baggs SP (Dade)	Accepted
90-204	20 June 90	Bahama Mockingbird	20 May 90	Ft. Lauderdale (Broward)	Accepted
90-202	23 May 90	Thick-billed Vireo	10 March-1 April 90	Hypoluxo Island (Palm Beach)	Accepted
90-185	1 March 90	Green-tailed Towhee	7 January 90	Lake Alfred (Polk)	Accepted
90-208	12 September 90	Lark Bunting	9 September 90	St. Marks NWR (Wakulla)	Accepted
90-209	31 August 90	Golden-crowned Sparrow[1]	20 June 90	Islamorada (Monroe)	Accepted

[1]Documentation includes photograph(s).

IN MEMORIAM

Fla. Field Nat. 19(4): 122-125, 1991.

OSCAR T. OWRE, A TEACHER OF ORNITHOLOGY

The passing of Dr. Oscar T. Owre has left a void in the lives of Florida's birders, ornithologists, and the many others who cherished his friendship, but especially in the lives of his former students. His death on 9 August 1990 at his Minnesota cabin was a huge loss to Florida Ornithology. If there was one universal response to his loss, it is that "it was just too soon." Yet it has come to pass, and it is up to those whose lives he has touched to continue in the way he would have urged us to do if we could still depend on hearing his hearty encouragement, "Yes, yes."

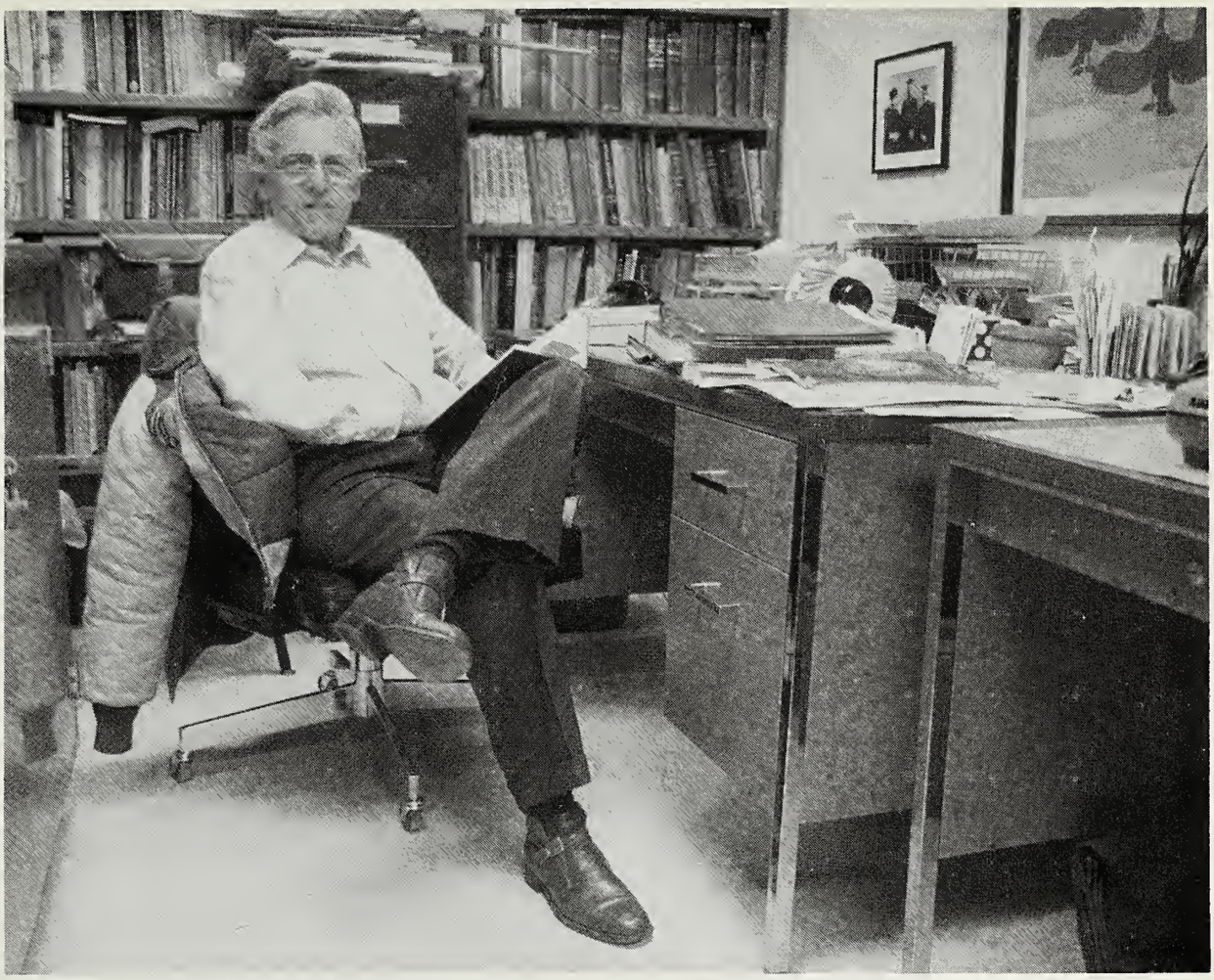
The details of his life and accomplishments are well known and are described elsewhere (see *Tropical Audubon Bulletin* Oct., 1990, and *Auk* 108: 705, 1991). In this memorial, we — some of his former graduate students — wish to pay tribute to Oscar T. Owre, this gentle man and gentleman, as our teacher of ornithology and of life. He was, above many other things, a truly dedicated and enthusiastic teacher and mentor to an incredible and continuously large gaggle of graduate and undergraduate students.

Great teachers like Dr. Owre are surely born more than made. Coming from a heritage of academe, education and public service, he was drawn naturally into his calling. His heritage along with his fundamental understanding of birds, was an unbeatable combination. Yet added to this were his sparkling intellect, his insistence on excellence in all things, his motivational approach to teaching, his attention to the needs of his students, and his breadth and depth of knowledge on so many aspects of life. He cared about so much more than birds: about music, theater, geography, history, politics, social concerns, science in its broadest scope, and especially the south Florida environment. His mind reached out to encompass virtually anything of intellectual worth.

The extra ingredient that made him such an extraordinary teacher was his wondrous sense of play. To him, learning new things was the most enjoyable of enterprises. He never stopped, and expected others never to stop, searching for new ideas, new information, or new ways of looking at life. How excited he could become over a new idea from a technical paper. His laboratory was the field, and he would lead his students through the swamps and on exhausting expeditions to the rain forests not only to study birds but to learn about themselves and about life. He was an astute observer of humanity, enthralled by human foibles, and in possession of a keenly honed sense of irony.

The intellect and knowledge, the play, the humanity, all are what made Bud Owre wise. He was a scholar and philosopher, a lover of life. Wisdom oozed from the pores of every lecture. One who listened could never be bored. The very next utterance could change a long-held perception of life. Of course, the next utterance could just as easily be an unexpectedly pointed question. He was always testing his students, himself, and in fact every one else he knew. He knew his subjects and did not allow others not to know theirs. Intellectual muddle was not to be condoned. He brought out the personal best in each of his students, but respected individual limitations.

Although we spent decades in school taking dozens of courses, we uniformly recall Bud Owre's ornithology courses as among the toughest and most inspirational. The most notable was his "Birds of the World" course. The class was based on one of his great prides, the University of Miami Reference Collection, which through his tireless efforts contained representatives of nearly every family of bird. The class was endured by a handful of overwrought graduate students, regular visitors, participating guests, and famous ornithologists passing through Miami, who were rounded up to share their specific knowledge.



Bud Owre in his office at the University of Miami.

The evening classes were marathons, lightened only by strong coffee and sugary treats. The pressure to perform was overwhelming, not so much from him as from the fellow students. But he loved the literature, and would seldom answer a question directly but rather took the extra time to show the inquisitor where and how to look it up. Preparation for tests continued well into the night. Several times graduate students fell asleep in the Reference Collection to be awakened by the shrieking janitorial staff, who, in any case, never knew what to expect when they opened the door. The oral final examination was widely known to include a memorized recitation and description of every family of bird. Yet when one of his head-strong pupils refused on principle to do the rote memorization, the result was a long discussion of the merits of taxonomic lists and a kindly eliciting from the student of all the appropriate information anyway. The class may be characterized as an intense, delightful blend of academic inquiry and genteel civilization.

It is puzzling in retrospect that such a fine mentor seldom explicitly directed anyone to do anything. Rather, he would discuss options, propose alternatives, warn of impediments, and reveal potentials. He had in mind many interesting research projects and knew which ones he wanted done. But a student never realized that he or she had been led by the hand to one of the most important decisions of his or her life — to undertake a specific piece of research. He would set you on the boat, but let you chart your own course. He would toss you a line if you fell overboard, but you had to pull yourself in. He was an expert in teaching his students how to sail life's seas for themselves, but he also offered shelter from the winds of "the system."

Perhaps his most intrusive pedagogical process was his review of a thesis. If the student could handle it, this was a word by word, comma by comma dissection of the long-labored

document. Remembered are long hours of sitting across the table reading aloud and bloody conflicts over syntax and grammar. In one case an argument over split infinitives led to an immediate appointment with an English professor, who sagely declared that the difference was that between formal and informal writing, which, of course, opened the never resolved discussion as to the formality of thesis writing. In the end (discretion being the better part of valor) infinitives were unsplit in the thesis and resplit before publication. This was risky, as it was not unusual to have Dr. Owre threaten to retroactively revoke a previously awarded degree for a later action that did not meet standards. The second great challenge was the defense of one's thesis. Although he always set the stage by revealing in advance what his first two questions were going to be, he always had a trick or two. In one case, for a student who despised Dr. Owre's own beloved field of anatomy, he spent the entire defense toying threateningly with a bird bone, yet never asked a question about it. For another, the committee members were served from a thermos of Bloody Mary mix. All students had to endure his field final, which consisted of home movies of birds in the wild, almost all out of focus, some flying backwards, all of which were to be identified.

Also remembered though is an extraordinary degree of tolerance. More than one graduate student appeared at his office door with a pet dog, rabbit, or parrot in hand — all of whom were tolerated, although one dog ate an important specimen. A chorus of parrots, his own and those of several graduate students, disrupted the entire science building for hours. His response to complaints on this or other matters was a winning chuckle. In spite of interruptions and disruptions, all who stopped by were greeted with his "How may I help you?" Within the university and in all other endeavors, it was Bud Owre who strove to create a light, tranquil, yet thoroughly intellectual environment, despite personalities, differences of opinion, and general chaos. He was the ultimate honest broker. His office was a never-changing sanctuary from the outside world. It was crowded to just this side of uselessness with books, bookcases, piles of projects in progress, and assorted treasures, such as a broken airplane propeller, a pickled grebe in a jar, a pair of snow shoes, miscellaneous bird bones and supplies of cookies.

He had an almost magical way of inspiring undergraduates. Many signed up for field trips but stayed with birds for life. His students had an uncommon need to share what they were doing and not a week went by that a former student didn't call or write. The process began over each season on his ornithology field trips. He would stride from the car in full gate, crossing a canal with water lapping his chin before scurrying off into the woods. His neophyte students stood in awe until they realized that they would have to scramble just to catch up with him. He was always a league ahead of his much younger companions, calling out the names of birds and enticing the birds to fly to him with an inimitable warble, identifying distant calls, and requiring at the most inopportune time that students identify a patch of fleeting feathers high in a tree. One trick was to require students to find the calling "metallic frog," which he never revealed was a clicker in his jacket pocket. His field lunches were masterpieces, something on the order of Danish cookies, pâté, Norwegian crackers, and an appropriate sherry. To him, being in the field with his birds, his students, and his lunch, was the wealth of a lifetime.

In the field and on campus, his practical jokes are legendary. The best of them we will never know, because he took great pride in pulling tricks that were never revealed. We could tell tales of when a Guyanan expedition was served vulture for dinner, of when in the middle of a boat race he jettisoned two students to lighten the load and win the contest, of food fights in Miami seafood restaurants, of getting in the middle of an Ecuadorian revolution and local Guyanan politics, of his many massive logistical failures such as when he and his students were trapped on Pigeon Key when the bridge was demolished or when his party and their belongings were tossed from boat to boat in the Pacific off Ecuador. For many years he carefully tended an empty aquarium in which he insisted resided "invisible fish." We could tell tales also of payback, when former students would arrive unan-

nounced to invade the solitude of his Minnesota cabin, of contracts for embarrassing public performances in his honor, of birthday cakes delivered at inopportune times, and of fake bird specimens inserted into his collection, where they remain to test the unwary.

His many contributions to Florida ornithology cannot pass without note. In most cases his name is nowhere to be found on them. He insisted that his students have their day in the sun. His contributions included the definitive study of the anatomy of anhingas and cormorants, studies of the avifauna of southern Florida especially of Biscayne Bay, studies of the exotic avifauna of south Florida (which he carried to the birds' homelands in India and Australia), and the historic first ornithological expedition into Lake Rudolph, Kenya with Robert Maytag. He carefully documented changes in species and the numbers of birds in the southern part of Florida. He had particular concern for Florida seabirds, colonial waterbirds, endangered species, and conservation of the south Florida environment.

Beyond these accomplishments, he set in motion studies on Red-whiskered Bulbuls and Yellow-winged Parakeets in southern Florida, the role of alligator ponds in the Everglades, and the biology of White Ibis, Northern Mockingbirds, flycatchers, wintering vultures, Snail Kites, Great White Herons, Cattle Egrets, House Sparrows, and Boat-tailed Grackles. His influence extended widely, encouraging and assisting such projects as those of Erma Fisk and Patricia Bradley. Ornithological studies by his former undergraduate students are uncounted.

Most of his students did not become professional ornithologists. He was wonderfully supportive in encouraging each to follow his or her own muse. They are restauranteurs, environmental consultants and planners, artists, writers, veterinarians, photographers, government biologists, teachers, statisticians, business persons, attorneys, medical doctors, academicians, and two of the five editors of this journal. Clearly, the discipline, the search for excellence, the humanity, the child-like enthusiasm for the study of birds, and the humor he instilled were universal tools for life. As he sagely said, "You never know what is in a frog until you step on it."

The passing of Dr. Oscar T. Owre — Maytag Professor of Ornithology and Professor of Biology at the University of Miami, past President of the Tropical Audubon Society, a founding member of the Florida Ornithological Society, Board Chairman of the Miami Museum of Science, a founding father of Biscayne National Park, a scholar of Florida birds, and a teacher of generations of students — has indeed left a void in the lives of Florida's birders, ornithologists, and many others who cherished his friendship, especially his students.—**Jane (Sprangers) Bolen**, Foley Blvd. Animal Hospital, 11247 Foley Blvd., Coon Rapids, MN 55433; **Randall Breitwisch**, Department of Biology, University of Dayton, Dayton, OH 45569; **Joan A. Browder**, National Marine Fisheries Service, Virginia Key, FL; **Daniel M. Cary**, Treasure Coast Regional Planning Council, 3228 S.W. Martin Downs Blvd., Suite 205, Palm City, FL 34990; **Mary V. Cummings**, 36 SW 27 Road, Miami, FL; **Sheila Gaby**, Gaby & Gaby, Environmental Consultants, 6832 SW 68 St., South Miami, FL 33143; **Susan Hilsenbeck**, University of Texas Health Science Center, San Antonio, TX 78284, **James A. Kushlan**, Department of Biology, University of Mississippi, University, MS 38677 (corresponding author), **Peter G. Merritt**, Treasure Coast Regional Planning Council, 3228 S.W. Martin Downs Blvd., Suite 205, Palm City, FL 34990; and **James Wiley**, U.S. Fish and Wildlife Service, Patuxent Wildlife Research Center, Laurel, Maryland 20708.

ANNOUNCEMENT

Oscar T. Owre Memorial Fund.—The Tropical Audubon Society has established the Oscar T. Owre Memorial Fund to assist undergraduate students to pursue their interests in ornithology. Contributions may be mailed to Tropical Audubon Society, Inc., 5530 Sunset Drive, Miami, Florida 33143.

FIELD OBSERVATIONS

Fla. Field Nat. 19(4): 126-131, 1991.

Spring Report: March-May 1991.—The observations listed here are based on unsubstantiated accounts of rare birds and unusual numbers of birds reported to the FOS Field Observation Committee (Jim Cox, Fred Lohrer [substituting for Linda Cooper], Peggy Powell, Bill Pranty, and Wayne Hoffman). The observations are not subjected to a thorough evaluation and formal peer review and thus must be considered tentative pending further review. We encourage observers to report their sightings to the FOS Records Committee (c/o Jocelyn Lee Baker, Secretary, 851 N. Surf Rd., #302, Hollywood, FL, 33019) for formal consideration. We also encourage observers to prepare formal notes and articles to describe extremely rare and unusual sightings.

Several conventions have been adopted to save space. A 3-character set of alpha-numeric initials is used to identify contributors within the accounts of individual species. A complete list of observers and corresponding initials is provided at the end of the report. The list of observers is organized alpha-numerically using the 3-character initials. Names of observers for this report are drawn from a master list containing >150 names, and this procedure may result in occasional gaps in the alpha-numeric sequence (e.g., the listing of BB2 without a previous BB1). Another convention adopted is the use of common names exclusively. Persons interested in scientific names should consult AOU (1983. Checklist of the North American Birds, 6th ed., Washington, D.C., Am. Ornithol. Union) and revisions published in *The Auk*. Other abbreviations used occasionally are: imm., immature; m. obs., many observers; NM, national monument; NP, national park; NS, national seashore; NWR, national wildlife refuge; SP, state park; SRA, state recreation area; and S, W, N, E, etc. for compass headings. Unless necessary to clarify the location, the counties of named locations are omitted.

The FOS Field Observation Committee would like to thank everyone who contributed information. Please bring any unusual observations not reported here to the attention of the complier.—**Jim Cox**, Florida Game and Fresh Water Fish Commission, 620 S. Meridian St., Tallahassee, FL 32399-1600.

Summary of the Spring Season

The spring season included reports of several extremely rare birds from different areas of the state. A first Florida record and only third U.S. record of Variegated Flycatcher was photographed at the Dry Tortugas. A potential first state record for Hook-billed Kite was reported from the Florida Keys based on 2 brief sightings. Two La Sagra's Flycatcher also were reported from the Keys and lingered long enough to provide many with an opportunity to add this species to their life lists. Two reports of Lazuli Bunting were received from north Florida within 4 days of each other. If the buntings were indeed the same bird, then the bird moved ± 120 km from NE St. Johns County to rural Alachua County.

The season also saw an unusual influx of storm petrels (mostly Leach's) along the northeastern coast with as many as 20 seen at 1 location. Two Band-rumped Storm-Petrels were reported from the Dry Tortugas. There were also 2 reports of Arctic Tern this spring from Franklin County and the Florida Keys. Other noteworthy sightings of pelagic species included large concentrations of Northern Gannets south of St. George Island and Magnificent Frigatebirds along the Big Bend coast. There was also a report of a large die-off of Common Loons at Panama City (Bay County), as well as the grounding of many Common Loons at an airport landing strip near Lake City following a heavy rain.

Two excellent "fall-outs" of songbirds were reported on 23 April and again on 30 April. Twenty-plus species of warblers were seen at 2 different areas in northwest Florida on the first date (while many FOS members were at the spring meeting in Tampa). Black-whiskered Vireos seemed prone to migrate past nesting sites this year as 3 reports were received from the panhandle. Finally, a report of House Finch in Ft. Myers deserves special mention as it represents an extension from recorded breeding sites in north Florida.

Species Accounts

Red-throated Loon: 1 at St. George Island (Franklin Co.) on 27 Apr (DE3).

Pacific Loon: 1 at pre-alternate molt at Big Sabin (Escambia Co.) on 9 Mar (RD1), probably 1 that wintered in the area.

Common Loon: 36± landed on the Lake City Airport (Columbia Co.) on 23 Apr (JK1); many more were heard circling overhead as grounded birds were collected for transport to a nearby lake. Other late sightings include: 1 at Sanibel Causeway (Lee Co.) on 1 May (VM1); 1 in basic plumage N of St. Augustine (St. Johns Co.) on 13 May (JC2); 1 at St. Marks NWR (Wakulla Co.) on 23 May (JC1); and 1 at Ft. Walton Beach (Walton Co.) on 25 May (DW1).

Pied-billed Grebe: pair nested on Stock Island golf course at Key West (m. obs.), unusual location.

Wilson's Storm-Petrel: 1 over surf at Flagler Beach (Flagler Co.) on 24 May (LB1, PP1); 2 at Ft. Clinch SP (Nassau Co.) on 27 May (HT1).

Leach's Storm-Petrel: 1 photographed in Florida Bay (Monroe Co.) on 11 May (AS1); many seen along NE Florida coast from 23 to 27 May: exhausted bird picked up at Jacksonville Beach Lifeguard Station on 23 May, later died; 20+ feeding in the surf amid bathers at Ft. Clinch SP (Nassau Co.) on 25 May (HB1); 8+ feeding along surf at Anastasia SRA (St. Johns Co.) on 25 May (JS6, PP1); 3 close to beach at Ft. Clinch SP (Nassau Co.) on 27 May (JH2, BM3).

Band-rumped Storm-Petrel: First record for Ft. Jefferson NM on 2 Apr and one between Dry Tortugas and Key West on 12 May (WBI, BH2, HL1).

White-tailed Tropicbird: one at Dry Tortugas 29 Mar.; one other sited in mid-Apr (ES2, WB1).

Magnificant Frigatebird: 3 along Dixie Co. coast in mid Apr (NW1); male at Panama City Beach (Bay Co.) on 15 April (LK1, EK1).

Northern Gannet: large numbers (100's) flying W along St. George Island (RW3) at several times.

Masked Booby: 2 imm. off Port Canaveral (Brevard Co.) on 18 Mar (BN2, DE2); 17 at Dry Tortugas throughout the season (WB1).

Brown Booby: 5 at Dry Tortugas on 29 Apr (HR1).

Red-footed Booby: 1 bird on 19 Mar at Dry Tortugas (PS4).

Brown Pelican: several unusual inland records: 5 over Archbold Biological Station (Highlands Co.) on 14 Apr (JG4); 3 over Newman's Lake (Alachua Co.) on 29 Apr (IF1), 4th report for area since 1975; 2 near Cross City (Dixie Co.) on 26 May (KN1, JC3).

Double-crested Cormorant: 4650 at IMC phosphate mines (Polk Co.) on 23 Mar (PF1), high count.

Least Bittern: fledglings at Wakulla Springs SP (Wakulla Co.) on 2 Jun (JP2), new nesting area.

Reddish Egret: 5 at Hagen's Cove (Taylor Co.) on 24 Mar, 5 and 28 Apr, and 5 May (NW1); 2 were in breeding plumage, but nests still elude Big Bend birders.

Great Blue Heron, white morph: 1 flying over Archbold Biological Station (Highlands Co.) on 7 Apr (GW1), very unusual for area.

GLOSSY IBIS: 4 at Ft. Walton Beach sewage plant on 30 Mar (RD1, SD1, LD2, LH2).

SCARLET IBIS: 1 N of Ft. Myers (Lee Co.) believed to be resident (VM1), origin suspect.

ROSEATE SPOONBILL: imm. S of Gainesville on 2 May (TT1, DW2); rare for area with no previous reports before June.

SNOW GOOSE: 15 flying over Lake Weir (Marion Co.) on 1 Mar (JW1); good number for season and location.

FULVOUS WHISTLING-DUCK: 1000 on Lake Okeechobee near Lakeport (Glades Co.) on 2 Mar (MM1, JG4); 6 at Stock Island Golf Course (Monroe Co.) on 3 Mar (MB2).

AMERICAN WIDGEON: 1 at Deering Estate Golf Course (Dade Co.) on 19 May (VE1) was late for area.

WHITE-CHEEKED PINTAIL: 1 in Mt. Dora throughout the period (WB1).

NORTHERN SHOVELER: 100+ at St. Marks NWR (Wakulla Co.) on 23 Apr (JC1), good concentration for late spring (equal number of males and females).

GREEN-WINGED TEAL: 1600 at IMC phosphate mines (Polk Co.) on 23 Mar (PF1).

RUDDY DUCK: 5300 at IMC phosphate mines (Polk Co.) on 23 Mar (PF1), high count.

GREATER SCAUP: 5 females at McKay Bay (Hillsborough Co.) on 20 May (BN2), late.

COMMON MERGANSER: 1 male at Tallahassee on 2 Apr (BP1).

RED-BREASTED MERGANSER: 3 at Grayton Beach SRA (Okaloosa Co.) on 25 May (DW1).

SURF SCOTER: young male at St. Marks NWR (Wakulla Co.) on 14 Mar (JC1), unusual; male at IMC phosphate mines (Polk Co.) on 12 May (PF1), second co. record.

CRESTED CARACARA: reported in new area of Palm Beach Co. (JB1), near Miami Canal.

HOOK-BILLED KITE: 1 brief sighting on Sugarloaf Key (Monroe Co.) on 27 Apr (WH1, JK2) followed by another brief sighting on 29 Apr (KE1); if verified, first U.S. record outside of Texas.

BLACK-SHOULDERED KITE: 1 in new area of NW Broward Co. on 25 Apr (JB1, GM1).

SNAIL KITE: continued a strong showing in northern areas of range: 1 at Lake Istokpoga (Highlands Co.) on 30 Mar (MM1, RB2); 4 at Lake Kissimmee (Polk Co.) on 18 Mar (MM1, AB1); also present at Lehigh Acres (Lee Co.) and possibly nesting in area (VM1).

BLACK-SHOULDERED KITE: 1 successful nest in E Everglades (PS1).

SHORT-TAILED HAWK: 2 in Green Swamp (Polk Co.) on 17 Mar (JF1), possible migrants; 1 near Sneads (Jackson Co.) on 1 Apr (RD1, LD2), birds reported from area before; seen in remote areas of Taylor Co. in early and late May (BM2); 1 also reported in Cedar Key (Levy Co.) on 1 Jun (JP2); 4 birds NE of Avon Park throughout period (WB1).

GOLDEN EAGLE: imm. near Panama City (Bay Co.) on 16 May (DS2).

BLACK RAIL: 20+ territories found in coastal area of Dixie Co. (NW1) by 5 May; territories appear to begin to form in early April (NW1).

SORA: migrant on private lawn in Tallahassee (Leon Co.) on 8 Mar (BN2), unusual location.

SANDHILL CRANE: subspecies *canadensis* at Paynes Prairie from 7 to 18 Mar (SN1); SN1 believes this is first record of the "lesser" subspecies in state.

LIMPKIN: 2 reports from panhandle: 1 at Morrow Lake on 1 Apr; 1 on Choctawhatchee River (Walton Co.) in early Apr (*fide* DW1); reported nesting in new areas of NE Broward Co. (JB1, CP1).

BLACK-NECKED STILT: 2 at sewage treatment plant S of Tallahassee on 24 Mar (NW1); 2 at Paynes Prairie SP on 28 Mar (RR1), 5 at this location on 30 Mar (HA1); 2-5 at Ft. Walton Beach sewage treatment plant 30 Apr-22 May, rare in spring.

WHITE-RUMPED SANDPIPER: 1 at sewage treatment plant S of Tallahassee (Leon Co.) on 25 Apr (HS1) and again on 26 May (JS3); 1 at St. George Island SP (Franklin Co.) on 27 Apr (RW3); 3 at Dry Tortugas on 29 Mar to mid-May (WB1).

PEEPS: 12500 (mostly Least Sandpiper) at IMC phosphate mines on 23 Mar (JF1), very large number.

STILT SANDPIPER: 185 at Merritt Island NWR (HR1) on 1 Apr; 1500 at IMC phosphate mines (Polk Co.) on 4 May (JF1).

SPOTTED SANDPIPER: 25 at George's Lake (Putnam Co.) on 20 May (LM1).
UPLAND SANDPIPER: 4 near Venus (Highland Co.) on 11 Apr (JG4); 1 at Kanapaha Prairie (Alachua Co.) on 23 Apr (SN1).
PECTORAL SANDPIPER: 1 at Paynes Prairie SP (Alachua Co.) on 7 Mar (BM3, JD3); rare here in spring and also early.
DUNLIN: 250 at Hagen's Cove (Taylor Co.) on 5 May (NW1), good concentration.
SHORT-BILLED DOWITCHER: 2100 at IMC phosphate mines (Polk Co.) on 6 Apr (PF1).
LONG-BILLED DOWITCHER: 1 at sewage treatment plant S of Tallahassee (Leon Co.) on 3,4 Apr (BN2, DE2), confirmed by call.
LONG-BILLED CURLEW: wintering at Cape San Blas (Gulf Co.) 10 Mar (JS3).
BLACK-BELLIED PLOVER: 65 at Hagen's Cove (Taylor Co.) on 5 May (NW1).
AMERICAN OYSTERCATCHER: 1 on S Big Pine Key on 16 May (SF3), rare in Keys.
LAUGHING GULL: 25 over Gainesville on 16 Apr (JH2); large group for this inland area.
ROYAL TERN: 3 over Archbold Biological Station (Highlands Co.) on 2 Apr (AB1), unusual inland sighting.
ARCTIC TERN: 1 E of St. George Island SP (Franklin Co.) on 29 Apr (DE3), good details; 1 photographed at Islamorada (Monroe Co.) on 13 May (WH1).
BLACK NODDY: 3 at Dry Tortugas from late Mar to mid-May (WB1).
BLACK SKIMMER: 427 at IMC phosphate mines (Polk Co.) on 23 Mar (PF1).
WHITE-WINGED DOVE: 2 at Cape San Blas (Gulf Co.) on 26 May (RC2), uncommon.
EURASIAN COLLARED-DOVE: 2 in coastal Dixie Co. on 5 May (NW1); 1 at Live Oak Island (Wakulla Co.) on 5 Apr (BP1); spreading along coast.
ROSE-RINGED PARAKEET: new breeding record from Crystal River (Citrus Co.), very distant from nearest known breeding locality (BS3).
YELLOW-BILLED CUCKOO: early record at Cape San Blas (Gulf Co.) on 24 Mar (JS3).
MANGROVE CUCKOO: 2 records for Pinellas Co.: 1 at Ft. DeSoto Park on 27 Apr (AW1, PW1); 1 at Weedon Island on 25 May (RS2); presumably breeds in co., but no confirmed records from breeding bird atlas.
GROOVE-BILLED ANI: 1 at Eco Pond Everglades NP from winter to 28 Apr (m. obs.).
BARN OWL: 1 nested under I-75 (JB1) near the Miami Canal (Broward Co.).
BURROWING OWL: 1 at Dog Island (Franklin Co.) on 9 Mar (FJ1, DE3); rare for panhandle; 1 at Dry Tortugas from 29 Mar to Early May (WB1, ES2).
SHORT-EARED OWL: 1 at Dry Tortugas from 29 to 30 Apr (HR1).
WHIP-POOR-WILL: 23 singing in a 150 m radius circle at main grounds of Archbold Biological Station (Highlands Co.) on 10 Mar, high count (AB1).
CHUCK-WILL'S-WIDOW: nest at Deering Estate (Broward Co.) on 29 May (VE1), unusual.
RUBY-THROATED HUMMINGBIRD: 1 on nest on St. George Island (Franklin Co.) on 27 Apr (KN1, DM2, JC3), nesting on island not previously reported.
CUBAN EMERALD: 1 female at Mahogany Hammock, Everglades NP 4-7 May (WB1, DL3, ML1, LA1). First Florida report since 1980.
LA SAGRA'S FLYCATCHER: 1 in Islamorada 7 April to early May (PS1, SS2, m. obs.).
GRAY KINGBIRD: 1 near Venus (Highland Co.) on 15 Apr, uncommon migrant in co. (JL1).
EASTERN WOOD-PEEWEE: 1 at Shired Island (Dixie Co.) on 26 May (KN1, JC3), late migrant or unusual breeding location.
OLIVE-SIDED FLYCATCHER: 1 E of Florida City on 20 Apr (HL1, BH2).
LOGGERHEAD KINGBIRD: 1 at Tavernier on 28 Apr (LP1, DK1).
SCISSOR-TAILED FLYCATCHER: 1 at Cedar Key (Dixie Co.) on 9 Apr (DH2) and again on 18 Apr (BM3, MG2); 1 near Miami Canal (Broward Co.) on 12 Apr (JB1); 1 at Cape San Blas (Gulf Co.) on 26 May (RC2).
VARIEGATED FLYCATCHER: 1 at Dry Tortugas on 15 Mar (RB3).
BAHAMA SWALLOW: 1 at Cutler Ridge (Dade Co.) in the Cave Swallow Coloney from 2 Mar through May (MW1).

AMERICAN ROBIN: 1 at St. George Island SP (Franklin Co.) on 23 May (JC1); 1 S of Perry (Taylor Co.) on 26, 28 May (JC3, KN1); no evidence of breeding activity.

VEERY: 1 at Captiva (Lee Co.) on 20, 27 Apr (VM1).

GRAY-CHEEKED THRUSH: 1 at Captiva (Lee Co.) on 20 Apr (VM1).

BAHAMA MOCKINGBIRD: 1 at Bill Baggs Cape Florida SRA on 30 Apr (CP1, BE1); 1 at N Key Largo on 25 May (PS1, SS2); 1 at Hypoluxo Island (Palm Beach Co.) 11 May (DC5).

GRAY CATBIRD: territorial bird at Cape San Blas (Gulf Co.) on 26 May (RC2); rare, but other breeding season records on nearby mainland.

RED-BREASTED NUTHATCH: 1 at St. Joseph SP on 3 Mar and 6 Apr (BN2, DE2).

CEDAR WAXWING: 29 killed after striking a building in Tallahassee on 27 Mar (BD3).

THICK-BILLED VIREO: 1 in Islamorada (Monroe Co.) on 11 Mar to late Apr (TK1, PS1).

PHILADELPHIA VIREO: 1 photographed at Ft. DeSoto Park (Pinellas Co.) on 21, 22 Mar (LA1, MW2), very early; another at Ft. DeSoto Park on 5 Apr (LA1).

BLACK-WHISKERED VIREO: 1 (*barbatulos* race) at Gulf Breeze (Escambia Co.) on 20 Apr (RD1); 1 at St. George Island (Franklin Co.) on 23 Apr (JC1) and later on 27 Apr (DM2, KN1, JC3); 2 at St. Joseph Island SP (Gulf Co.) on 23 Apr (RI1, AI1).

BLUE-WINGED WARBLER: 1 wintering at Deering Estate (Broward Co.) remained until 20 Mar (VE1); 1 at Captiva (Lee Co.) on 30 Mar (VM1).

TENNESSEE WARBLER: 1 on Captiva (Lee Co.) on 9 May (VM1).

CERULEAN WARBLER: male in Winter Park (Orange Co.) on 19 Mar (HR1).

BLACKPOLL WARBLER: female at St. Marks NWR on 23 May (JC1), late migrant.

PROTHONOTARY WARBLER: 1 at St. Andrews SP (Bay Co.) on 3 Mar (BN2, DE2); 15 at Lake Kissimmee SP (Polk Co.) on 15 Mar (PF1), early dates.

WORM-EATING WARBLER: 3 at Deering Estate (Broward Co.) on 20 Mar (VE1); 1 at Captiva (Lee Co.) on 5 Apr, and 2 at Captiva on 13 Apr (VM1).

SWAINSON'S WARBLER: 1 in Mallory Swamp (Dixie Co.) on 25 May (KN1, JC3).

MOURNING WARBLER: 1 at Sanibel (Lee Co.) on 27 Apr (*fide* VM1).

CONNECTICUT WARBLER: male banded at Casey Key (Sarasota Co.) on 9 May (AS2, SS1); another male banded at same location on 12 May.

WILSON'S WARBLER: 1 at St. George Island SP (Franklin Co.) on 23 Apr (JC1), rare.

YELLOW-BREASTED CHAT: 1 banded at Casey Key (Sarasota Co.) on 13 Apr (AS2, SS1).

STRIP-HEADED TANAGER: 1 male at Bill Baggs Cape Florida SRA 1-3 Apr (JS7).

LAZULI BUNTING: 1, a young male, at feeders at Ponte Vedra Beach (St. Johns Co.) on 19-22 Mar (CC2); another seen in rural Alachua Co. on 25-26 Mar (RW4); both sightings include good descriptions of birds.

PAINTED BUNTING: 1 NW of Gainesville on 12 Apr (JS5), formerly common but now rare in area; female at St. Marks NWR (Wakulla Co.) on 21 Apr (HS1), uncommon in area; 1 at St. George Island SP (Franklin Co.) on 23 Apr (JC1).

DICKISSEL: male at Belle Glade (Palm Beach Co.) on 5 Apr (HR1); female at St. George Island SP (Franklin Co.) on 23 Apr (JC1); 1 at Cedar Key on 28 Apr (DH2).

LARK SPARROW: 1 at Ft. Desoto Park (Pinellas Co.) on 6-22 Apr (LA1, LH1, DG1), rare migrant that remained for a long period.

LE CONTE'S SPARROW: 1 at St. George Island SP (Franklin Co.) on 27 Apr (RW3).

LINCOLN'S SPARROW: 1 at Ft. Pickens NM (Escambia Co.) on 30 Mar (RD1).

CLAY-COLORED SPARROW: 1 wintered at Archbold Biological Station (Highlands Co.) until approximately mid-Mar (JF2), associated with flock of Chipping Sparrows.

YELLOW-HEADED BLACKBIRD: female in Dade City (Pasco Co.) on 3 Apr (HR1).

BROWN-HEADED COWBIRD: 40 at Blind Pass (Lee Co.) on 3 Mar (VM1); large concentrations reported from Captiva Island on 11 Mar (VM1); present at Flamingo (Monroe Co.) throughout period (WH1).

SHINY COWBIRD: 1 along Choctawhatchee River (Okaloosa Co.) on 20 Apr (DW1); 1 on Cudjoe Key (Monroe Co.) on 26 Apr (WH1); on Dry Tortugas from 29 Mar to mid-May (WB1); 2 on Plantation Key for at least a week in late Apr (RS2); 2 more records for Pinellas Co. (LH1, LA1, MW1) in late Apr; 1 at Ft. Walton Beach sewage treatment plant (Walton Co.) on 4 May (RD1); 1 at Captiva on 16 May (VN1); present at Flamingo off and on throughout the period (WH1).

BOBOLINK: large flock (100's) at Ochlockonee River SP (Wakulla Co.) on 2 Apr (DE2, BN2).

HOUSE FINCH: 1 in downtown Ft. Myers on 13 May (VM1); 1 at Crestview (Okaloosa Co.) on 22 May (IM1).

HOUSE SPARROW: 1 female at Dry Tortugas on 29-30 Mar (WB1, ES2).

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EDITORIAL

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